

An Introduction to Healthier Textiles

What makes a textile 'healthier' and how can we make design decisions that foster positive planetary impacts?

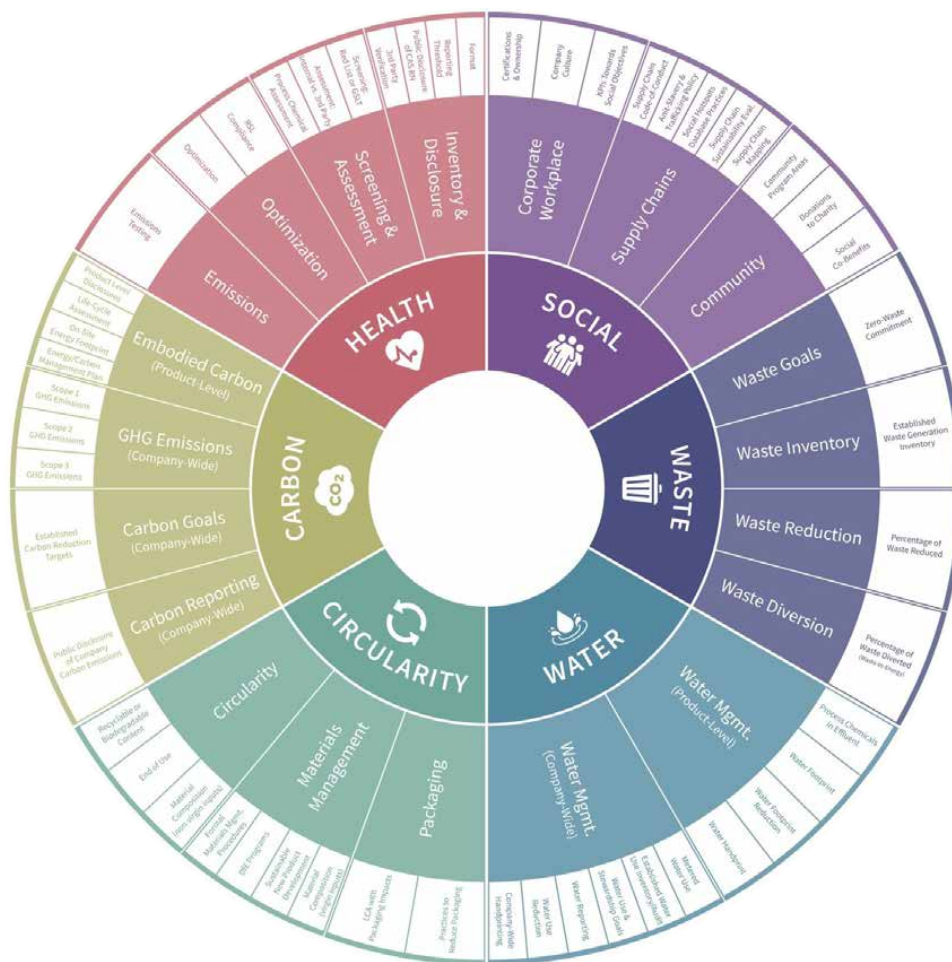


Making Positive planetary decisions

“Take, Make, Waste” has been the model for the global textile industry. Due to its heavy reliance on fossil fuel and overproduction, this industry is a major contributor to global pollution. Through our research, with input from textile experts and organizations, we have developed guides that holistically define the issues and future innovations of the textile industry.

In order to make design decisions that have positive planetary impacts, it’s important to focus on where systemic solutions can happen across six major categories of impact.

These introductory guides require no previous expertise. Each category is designed so that the reader can gain a larger picture of the overall, holistic systems transformation needed. You will see that there are overlapping perspectives, themes and approaches shared by each impact category. In each section, additional resources are provided so that you can dive deeper into topics that resonate with your practice and interests.



Core Questions

HEALTH



Have toxic chemicals been used in dyes, treatments or finishes?
Are any of the ingredients of the textile disclosed known to be toxic to health?
Have toxic chemicals been used in dyes, treatments or finishes?

CLIMATE



How energy intensive is the textile's production?
Was the textile's manufacturing powered by fossil fuels or clean energy?
Does the manufacturer participate in climate restoration initiatives such as regenerative agriculture?
If it's a bio-fabricated textile, how energy intensive is it's production?

WATER



Did the processes for growing raw fibers, dyeing, or finishing require large amounts of water?
Were toxic chemicals used in cultivation or production stages that could enter watersheds and adversely affect human or ecosystem health?
Were there regulations and audits in place at the site of production to ensure wastewater was properly managed?

CIRCULARITY



Is the textile's content from recycled, renewable or regenerative sources?
Is the textile amenable to recycling, upcycling, or composting?
Are the materials in the textile biodegradable & able to be returned to the earth's biological nutrient cycles?

WASTE



Can we reduce offcut waste through pattern efficiency?
Can the remnants be recycled?
Does the textile have a print, directional weave, or width that will lower yields?
Is the material prone to rejection due to quality issues?
Overall, does the garment promote quality and value in materials, or does it contribute to a culture of excessive consumption?

SOCIAL EQUITY



Was the textile and its raw material safely produced in accordance with fair labor protections? Were the textile workers paid a fair wage?
Does the textile operation provide access to transparent information of auditing, compliance, and/or supply chain practices?
Are resources reinvested in the community? Are textile producers investing in the local community beyond employment?

Core Questions:

- ♥ Were toxic chemicals used in the production or processing of fibers?
- ♥ Are any of the ingredients of the textile disclosed known to be toxic to health?
- ♥ Have toxic chemicals been used in dyes, treatments or finishes?



♥ Organic Fibers



♥ Treatments & Additives



♥ Ingredient Transparency

Summary

The clothing we wear and the sheets we sleep on could be making us sick. Toxic chemicals are used to make these everyday products and they have drastic impacts on the environment and on human health. In fact, 43 million tons of chemicals used in a given year of textile production are harmful to our bodies.¹

Synthetic fabrics require the addition of chemicals. Organically grown textiles such as wool, hemp, linen and jute do not. Organic fibers also have properties that support the health of people and the planet.²

Commonly used dyes, finishes, coatings, and textile treatments can contain chemicals of concern that are carcinogens or endocrine disruptors. By identifying these chemicals, we can divert our exposure, and seek healthier alternatives.

Consumers can consider health effects when purchasing products by looking for textile manufacturers with transparency practices such as disclosure ingredient labeling or specialized garment care. If the chemical content of a given product is not disclosed, the textile should not be used.

Key Systems:

- ♥ Extractive Industries
- ♥ Garment Care
- ♥ Wastewater Management
- ♥ Pesticides
- ♥ Treatments & Additives
- ♥ Ingredient Transparency

Agents of Concern:

- ♥ Pesticides
- ♥ Fertilizers
- ♥ Dyes and finishing

Key Effects:

- ♥ Endocrine Disruption
- ♥ Neurological toxin
- ♥ Carcinogenic
- ♥ Allergenic
- ♥ Respiratory Irritation
- ♥ Bioaccumulation
- ♥ Bactericidal
- ♥ Ecotoxicity

1. Toxic Textile's 2019 Report, Green America. pg 3.

2. Fletcher, K., Sustainable fashion and textiles: Design journeys (2014), p.16

Highlighting Innovations



Uplifting Organic

Nature's original wicking material does not require toxic additives due to its strong interlocking fiber structure, and because it is naturally coated in lanolin oil, a wax that makes it resistant to moisture and dirt. Wool is also naturally flame retardant so it does not require added toxic chemicals to prevent fire spread. More information about the properties of wool can be found in [Fibershed's Clothing Guide](#).



Healthier Treatments

Plant, bacteria, or other bio-based dyes require less water input, and unlike traditional processes, do not dump toxic waste into our waterways. Natural pigments such as indigo and turmeric have historically been used for their antibacterial health properties, showcasing the benefit of natural textile treatments. More information about natural dye processes can be found in [The Maiwa Guide to Natural Dyes](#).



Ingredient Disclosure

Look out for potentially harmful ingredients by using published third-party disclosures such as Red List Free, Declare labels or OEKO-TEX® to ensure disclosed product additives are not harmful to your health. 80% of a product's health and ecological impacts are decided at the design phase. When design teams are producing on a smaller scale they can work with local makers to advocate for transparency.

Health Empowered Initiatives:



ZDHC Detox to Zero

The ZDHC Foundation creates resources for sustainable chemical management practices to establish the road towards a future of zero toxic chemicals in textiles.



Oeko-tex

A textile with a Standard 100 label dictates that every component of the textile, from zipper to lining, excludes harmful substances to human health.



Organic Content Standard

Standard reviewing full textile process, from manufacturing to distribution, of textiles made from 70% certified organic natural fibers in products, yarns, fabrics and clothes on various levels of health based criteria.

Additional Resources:

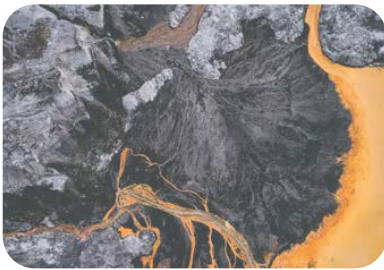
Material Health Resources, *Cradle to Cradle*. Want to learn more about what is factored into evaluating a textile's material health? C2C provides insight with a vetted textile directory.

Precautionary List, *Perkins & Will*. List of substances commonly found in the built environment that have been classified by regulatory entities as being harmful to human health and/or the environment.

Standards in Plain Language, *New Standard Institute*. Learn health-focused standards used in the textile industry with this comprehensive guide.

Core Questions

- How energy intensive is the textile's production?
- Was the textile's manufacturing powered by fossil fuels or clean energy?
- Does the manufacturer participate in climate restoration initiatives such as regenerative agriculture?
- If it's a bio-fabricated textile, how energy intensive is it's production?



Extractive Industries



Manufacturing



Regenerative Agriculture

Summary

Polyester is the most commonly produced textile in the world. It is also petroleum-based. The textile industry is currently responsible for 1.2 billion tonnes of CO2 emissions each year.¹ The first step to reduce the textile industry's carbon footprint should be to shift away from using fibers made by highly extractive industries.

To significantly reduce the textile industry's carbon emissions, we should support textiles made using cleaner energy, such as solar or wind, and use regenerative agriculture practices over a continued reliance on fossil fuels.

50% of energy consumed in the textile manufacturing process is due to inefficient machinery and the use of heat-intensive chemical treatments. Energy-efficient solutions would lower the textile industry's energy consumption.

It is critical to understand how textile production affects the local community and their ecosystems. We should prioritize local growers and producers, and consider energy use and practices, at every stage of the supply chain.

Key Systems:

- Manufacturing processes/ equipment
- Extractive Industries
- Clean Energy Infrastructure
- Regenerative agriculture

Agents of Concern:

- Displacement
- Carbon sequestration

Key Effects:

- Climate Change
- Land Grabbing
- Extreme Weather

¹. Ellen MacArthur Foundation, A new textiles economy: Redesigning fashion's future, 2017.

Highlighting Innovations



Clean Energy Sources

During the UN's 2020 Climate Week, some major textile companies committed to global energy efficiency goals. If met, these goals are estimated to account for 40% reduction of greenhouse gas emissions in the next decade. This reduction will be driven by a shift from fossil fuel energy sources to renewable energy infrastructure like wind and solar. Learn more about the fashion industry's clean energy transition on the Climate Group's platforms: [Race to Zero](#) & [Race to Resilience](#).



Climate Beneficial Fibers

Using natural fibers can reduce carbon from the atmosphere, especially when sourced locally to lower transportation emissions. Fibershed Marketplace is an entire database devoted to developing bioregional fiber economies. They have recommended certified natural fibers that help restore ecosystems through rotational grazing practices and composting. [Fibershed Marketplace](#) supplies bioregional fibers that are climate beneficial, organic, fibershed blends or biodynamic.



Existing Approaches

Regenerative textile production is considered one of the leading climate solutions, and it must be acknowledged that these interconnected approaches are rooted in Indigenous stewardship. Indigenous practices have long conserved biodiversity and ecosystems. The conservation of native bast fibers such as dogbane, nettle and milkweed is an important precedent for current regenerative textile practices. Find out more about native fiber systems through [Fibershed's Native Plants for Textiles](#).

Certifications & Standards:



Carbon Disclosure Project

Not for profit charity populating vast global environmental disclosure data to provide textile companies insights to reduce climate impacts.



Global Reporting Initiative

Standard for reporting a company's economic, social and widespread environmental impact with focus on energy consumption, emissions, and data transparency.



Carbon Trust Standard

Standards for ensuring green transitions to future energy systems and net zero emissions for companies with specified criteria through their The Carbon Trust Standard for Carbon.

Additional Resources:

[Healthy Soils, Healthy Communities](#), *Carbon Cycle Institute*. Report details how climate resilience goes hand in hand with environmental justice issues of access and pollution.

[Why is Chemistry Important to Design](#), *Bhawani Venkataraman*. Chemistry scholar explains how a product's chemical composition is key to understanding the pressing climate issues we face today.

Core Questions

- Did the processes for growing raw fibers, dyeing, or finishing require large amounts of water?
- Were toxic chemicals used in cultivation or production stages that could enter watersheds and adversely affect human or ecosystem health?
- Were there regulations and audits in place at the site of production to ensure wastewater was properly managed?



Water Consumption



Chemical Outputs



Wastewater Management

Summary

Massive amounts of water are diverted from communities to create textiles, the effects of which are especially felt in regions that face water scarcity. The fashion industry consumes 93 billion cubic meters of water annually. Interventions are necessary to both reduce water consumption and to address the polluting practice of textile manufacturing.

When it comes to the amount of water consumed in textile production, conventional cotton ranks as the most water intensive crop. It is also the most frequently produced. Polyester, another ubiquitous material, uses the second-highest amount of water.

Common watershed contamination issues stem from pesticides used to grow conventional natural fibers and chemicals used in fracking to extract crude oil to create synthetic fibers. Acids, solvents, and heavy metals are also commonly used in the dye and finishing phases of textile production and further contribute to water contamination.

Each year, half a trillion gallons of freshwater are used in the dyeing process of textiles, amounting to 20% of global industrial water pollution discharged into local watersheds.

Key Systems:

- Water Consumption
- Wastewater Management
- Agricultural Practices
- Garment Care

Agents of Concern:

- Pesticides
- Fertilizers
- Dyes and finishing

Key Effects:

- Eutrophication
- Acidification
- Ecotoxicity
- Water Scarcity
- Microfibers

Highlighting Innovations



Regenerative Practices

Shifting our preference to natural systems that utilize rain-fed fiber crops, and organic practices help improve soil quality and increase water absorption. The future of our water systems depend upon higher rates of water recycling, utilization, and wastewater processing to be incorporated into the design process. Learn more about the role of regenerative agriculture in conserving waterways from the [Rodale Institute of Regenerative Agriculture](#).



Organic Farming

Nitrogen and phosphorus-based pesticides are used to deter mold, weeds and insects. However, they disrupt watersheds when concentrated levels of nitrogen runoff drive eutrophication. The absence of synthetic pesticides in organic farming eliminates chemical runoff in local watersheds, thereby reducing toxics in aquatic life and drinking water. Find out more about ways to combat agricultural Nutrient Pollution from the [EPA](#).



Garment Care

A single washing of a synthetic garment above 30 degrees Fahrenheit will release 1,174 milligrams of microfibers. By presenting consumers with well-considered garment care instructions, we can lessen microfiber pollution burden on waterways. Combatting microfiber shedding from synthetic garments can be done in the home with washing machine filter attachments or microfiber garment bags. Find more garment care resources from [Guppyfriend's Wash Guide](#).

Certifications & Standards:



Organic Content Standard

Standard reviewing full textile process (from manufacturing to distribution) of textiles made from at least 70% certified organic natural fibers in products, yarns, fabrics & clothes on environmental & social criteria.



Global Organic Textile Standard

Standard targeting processing & manufacturing of textiles made from a minimum content of 70% organic fibers based on high-level environmental & social criteria.



Bluesign

Certification evaluating textile's ability to minimize consumption of all resources. In the case of dyeing & finishing, Bluesign ensures that a manufacturer has used the least amount of water as possible during production.

Additional Resources:

Plastic Fashion, 5 Gyres Institute. 5Gyres Institute overviews how synthetic fibers are polluting our oceans and actions to go plastic-free.

Urban Dyer's Almanac, New York Textile Lab. Archive of natural dye recipes created by students in Laura Sansone of NY Textile Lab's Natural Dyeing course.

RiverBlue, Mark Angelo. Documentary spanning the globe to trace the impact of the fashion industry on water sources.

Circularity

Fundamentals

Core Questions

- 🔄 Is the textile's content from recycled, renewable or regenerative sources?
- 🔄 Is the textile amenable to recycling, upcycling, or composting?
- 🔄 Are the materials in the textile biodegradable & able to be returned to the earth's biological nutrient cycles?



🔄 Sourcing Criteria



🔄 Material Management



🔄 End of Life

Summary

Globally, more than half of fast fashion is disposed of within one year of production¹ through incineration, landfills, or displacement to outside communities, while less than 1% of clothing is recycled.²

Acknowledging the imbalance between the consumption of resources and production of waste has set the stage for circularity within the fashion industry. In circular design, every piece of a product becomes a regenerative resource rather than waste, by making critical sourcing, production methods and supply chain decisions.³

Material selection often focuses on design criteria like durability and structure. Circular sourcing prioritizes choosing textiles from recycled feedstocks, post-consumer, or industrial waste. Materials that cannot be reused, such as textiles that have high blend counts or fibers with certain finishes, backers, or coatings, should be avoided.

Maximize lifetime of a product in use by designing for longevity, durability and repair. Maximize lifetime of a product after use by offering a take back program appropriate for the product's next life.

Key Systems:

- 🔄 Sourcing Criteria
- 🔄 Material retrieval/reprocessing
- 🔄 Material Composition
- 🔄 Up-cycling
- 🔄 Down-cycling

Agents of Concern:

- 🔄 Additives, Dyes, and Finishes
- 🔄 Marine Biodegradability
- 🔄 Compostability
- 🔄 Recyclability
- 🔄 Material Integrity

Key Effects:

- 🔄 Ecotoxicity

1. Style That's Sustainable: A New Fast-Fashion Formula, McKinsey & Company
2. A New Textile Economy, Circular Fibers Initiative & Ellen MacArthur Foundation
3. Ellen MacArthur Foundation, What is a Circular Economy? Circular Economy

Highlighting Innovations



Made For Circularity

Using post-consumer or industrial waste is one step towards circular design. Yet additives such as performance finishes, laminated backers, or aesthetic coatings are often applied to transform waste into textiles. These additives render them non-recyclable in the future. Check with the manufacturer to assess additives applied during textile production. Learn more about industry innovations in textile recycling from Textile Exchange's [Fiber Platform](#), Fashion for Good's [Sorting for Circularity program](#) and Worn Again Technologies's [Fiber-Sort project](#).



Transparent Labels

Garment tags provide important fiber information, but traditional sewn-in labels aren't always accurate. Look for labels that center supply chain traceability. Additionally, polyester labels create fiber and color impurities in the recycling feedstock, so creative modes of tag removal are needed before recycling. Learn more about the role of textile labels in circularity and healthier alternatives through Circle Economy's 2018 report [Labels: Accurate or Not?](#)



Rent, Return, Renew

Maternity, baby's and children's clothing designers acknowledge the massive underutilization of their product in its rapid use and disposal. Designers behind [Borobai](#) provide a rental service centered on longevity, integrating lifetime return renting models so their designs can be continually resold. Designers can embrace circularity while working on a small scale with online circular platforms for sourcing or selling natural fabrics through [Queen of Raw](#), [Thrifty Notion](#), [Offset Warehouse](#) or [thredUp](#) while keeping fabric out of landfills.

Certifications & Standards:



Cradle to Cradle™ (C2C)

C2C is a globally recognized measure of safer, more sustainable products made for the circular economy evaluated across Material Health, Material Reutilization, Renewable Energy & Carbon Management, Water Stewardship, & Social Fairness.



Fashion Positive

Utilizing Cradle to Cradle certification methodology, this non-profit develops circular frameworks for direct material supply chain integration.



Textile Exchange

Non-profit working in industry to integrate circular textile standards with extensive resources for developing product end-of-life practices.

Additional Resources:

What is the Circular Economy, *Ellen MacArthur Foundation*. Foundation at the center of developing accessible design research that supports circular economies.

Open Education, *Slow Factory*. Open Education Institute provides public resources through free crash courses focused on fashion and circularity.

Higg Materials Sustainability Index (MSI), *Sustainable Apparel Coalition*. Cradle-to-gate material scoring tool informed by life cycle assessment data to engage designers and brands in environmental sustainability.

Core Questions

- Can we reduce offcut waste through pattern efficiency?
Can the remnants be recycled?
- Does the textile have a print, directional weave, or width that will lower yields?
- Is the material prone to rejection due to quality issues?



Efficiency



Material Quality



Value

Summary

In today's economy, our textiles are largely designed for disposal. Fashion production has doubled in the last decade, but use-rates have dropped by 40% to an average of six wears before an item is disposed of.¹ Fossil fuel driven models of "take, make, waste" in the industry leads to the landfilling or incineration of 87% of yearly textile inputs, costing the world \$100 billion annually.²

As the world's largest clothing exporter, US charities only sell 10-20% locally before shipping the remaining off to enter the secondhand global clothing trade.³ Communities across the globe don't have the capacity to continue housing the US's landfilled or donated textiles. But, much of what we consider to be waste still has value. We can use the power of our dollars, voices and votes to create a less wasteful industry.

Shifting our sourcing preferences to natural textile-to-textile recycled fabrics that are designed to be kept in-use such as organic hemp, linen or wool is key to conserving natural resources and ecosystem health.

Although deadstock was originally defined as damaged fabric, in many cases it is simply overproduced fabric due to a manufacturer's high yardage minimum. This surplus of fabric can be sold by the manufacturer, which allows it to be cost-effective to overproduce fabric. Yet, very often surplus fabric is discarded.

Key Systems:

- Deadstock/Liability
- Marker Efficiency
- Waste Management
- Recycling Infrastructure

Agents of Concern:

- Quality Control
- Incineration

Key Effects:

- Resource Waste
- Air Pollution
- Ecotoxicity

1. Ellen MacArthur Foundation, A new textiles economy: Redesigning fashion's future, 2017.

2. Ellen MacArthur Foundation, A new textiles economy: Redesigning fashion's future, 2017.

3. "The Life Cycle of Secondhand Clothing." Council for Textile Recycling, www.weardonaterecycle.org/about/clothing-life-cycle.html.

Highlighting Innovations



Denim Recycling

Transforming cotton, the most-used fiber, into denim is an extremely intensive process, yet denim is one of the least recycled textiles. Textile innovators like the [New Denim Project](#), [DenimX](#) & [European Spinning Group](#) recycle jean fibers and mix with bio-based binders to produce denim fabrics.



Disclosed Deadstock

Using deadstock is a zero waste design practice, but it is important to think beyond waste and understand the deadstock's material content. Consider buying scrap stock directly from small batch-based artisans who disclose material content on sourcing platforms like: [Queen of Raw](#), [FabScrap](#), [Thrifty Notion](#) or [Gaia Conceptions](#).



Mending Matters

When we take the time to learn mending techniques, we give greater value to textiles that evolve with us throughout life. Utilizing darning, patching, overdyeing or boro keeps self-sufficient craft practices alive, while keeping textiles out of the wastestream. Find more ways of changing your relationship to clothing through Orsola De Castro of Fashion Revolution's book [Loved Clothes Last](#).

Certifications & Standards:



Global Recycled Content Standard

Recycled content standard applied to the full supply chain including chemical content and labeling as well as its implication to social criteria.



Global Organic Textile Standard

Standard targeting processing & manufacturing of textiles made from a minimum content of 70% organic fibers based on high-level environmental & social criteria.



Recycled Claim Standard

An international, voluntary standard that sets requirements for third-party certification of recycled input with criteria for social and environmental processing requirements.

Additional Resources:

Preferred Fiber and Materials Market Report, *Textile Exchange*. Latest industry trends of environmental impact by fiber type.

How Much Does Garment Industry Actually Waste, *Reverse Resources*. Dive deeper into research about post-industrial waste from global fashion production in this 2020 report.

Dead White Man's Clothes, *OR Foundation*. Multimedia project mapping the livelihoods behind waste management in one of the world's largest second hand clothing markets in Accra, Ghana.

Social Equity

Fundamentals

Core Questions

- Was the textile and its raw material safely produced in accordance with fair labor protections? Were the textile workers paid a fair wage?
- Does the textile operation provide access to transparent information of auditing, compliance, and/or supply chain practices?
- Are resources reinvested in the community? Are textile producers investing in the local community beyond employment?



Workers Rights



Accountability



Community Development

Summary

Before clothes end up in our closets, they are a part of a highly labor-intensive industry that employs around 300 million people worldwide.¹ The industry is built on exploitative labor practices from farm to fiber, and disasters such as the 2013 collapse of Rana Plaza, Bangladesh or the COVID-19 pandemic further expose the cracks in its labor systems.

These exploitative practices built the textile industry. Europe and the United States became textile powerhouses in the 1800's by using a massive labor force of enslaved people. These reprehensible systems set the stage for the industry's rapid growth at the expense of their workers' lives. These systems live on today. For example, it takes only four days for a top textile CEO to earn the equivalent of what a Bangladeshi woman garment worker earns in her whole lifetime.²

Across the United States, new bioregional economies are connecting farmers, processors, designers and consumers. These local textile economies are based in interconnected value chains that build wealth for workers and preserve the land by growing natural fibers.

Support transparent textile brands and producers that share annual social investment progress reports, often called corporate social responsibility reports (CSR). Look for links to independent third party audit reports across value chains and compare the median wages of workers to the local living wages.

Key Systems:

- Workers Rights
- Auditing and compliance
- Community Development
- Indigenous Rights

Agents of Concern:

- Appropriation
- Subcontracting
- Employment Security
- Worker Health and Safety
- Freedom of Association
- Wages
- Hours of Work

Key Effects:

- Forced Labor
- Child Labor

1. Ellen MacArthur Foundation, A new textiles economy: Redesigning fashion's future, 2017.

2. Oxfam International Report

Highlighting Innovations



Living Wage Checker

Wage inequality is a significant issue in the textile industry, but more brands are adopting Enforceable Brand Agreements (EBA), making living wage agreements publicly available. These benchmarks go beyond the minimum daily living requirements, and instead recommend wages that can support a family above the poverty line and enable them to develop savings. Learn more about living wage benchmarks and Enforceable Brand Agreements from the Clean Clothes Campaign.



Policy Protection

Policy can ensure brands are held accountable to protect garment workers and provide living wages. For instance, in California, the Garment Worker Protection Act (SB1399) would defend workers rights through multilateral supply chain accountability, but it has yet to be passed. Learn more about the Garment Worker Protection Act from the Garment Worker Center.



Income Support

Garment workers are subjected to wage theft and lack of health and safety protections. These issues are exacerbated in times of crisis. The Know Your Grower, Know Your Sew-er program feeds over 200 furloughed or sick garment worker families per week to provide relief during COVID-19 crisis. Learn more about the The Know Your Grower, Know Your Sew-er program project from Suay.

Certifications & Standards:



Social Accountability 8000

Foundational certification standard developed in the 1980's based on the eight principles of the international labor rights movement such as the push for the end of child or forced labor.



World Fair Trade Organization

Fair trade business models are verified to go beyond transparency, good working conditions, and more criteria that creates positive social opportunity.



Sedex Members Ethical Trade Audit

Sedex is a not-for-profit conducting audits on site at factories to assess how labor, health and safety, environmental and business ethics standards are being met.

Additional Resources:

[How to Steal Your Workers' Future](#), *Clean Clothes Campaign*. Powerful film portraying the devastation that wage theft plays on garment workers and their families.

[Out of Sight: A call for transparency from field to fabric](#), *Fashion Revolution*. Report calling upon 60 brands to increase transparency by disclosing processing facilities and mills throughout their supply chains.

[Wage Ladder](#), *Fair Wear Foundation Program*. Tool comparing the wages paid at any textile factory against a range of wage benchmarks in order to understand a product's social impact.

Textile Glossary

ACIDIFICATION: harmful long term decrease in the oceans pH impacting marine life caused by absorbed excess CO2 emissions

ACCOUNTABILITY: textile companies transparently communicating their identified impact throughout all actions on people & the planet

ALLERGEN: substances that can cause allergic reactions such as skin dermatitis from polyester or respiratory irritation in workers exposed to cotton dust

APPROPRIATION: members of dominant majority misrepresenting traditional cultural expressions within designs in a harmful way without acknowledgment or compensation to the original culture. Learn more from [Curbing Cultural Appropriation in the Fashion Industry](#)

BACTERICIDAL: substances used in the growing of raw textile materials that prevents the growth of bacteria

BIOACCUMULATION: the build up of toxic pollutants at a faster rate than organisms such as fish or earth worms can excrete them

BLEACHING: chemical dependent process in production that removes any coloring from fibers

CARBON: vital element for sustaining life through the carbon cycle where it is key in photosynthesis, respiration & decomposition, however fossil fuel driven excessive quantities of carbon in the atmosphere cause imbalances in the carbon cycle, driving climate change

CARBON SEQUESTRATION: long term removal of the carbon dioxide from the atmosphere through trees, soil & other natural processes planet

CARCINOGEN: toxic substances that promote the growth of cancer. Learn more about ending use of carcinogenic dyes in apparel at [ZDHC](#)

CHEMICALS: artificial substances heavily utilized throughout textile production frequently linked to harmful health outcomes

CIRCULAR ECONOMY: replacing the linear extraction to disposal model for a system with textiles built with longevity through renewable feedstocks by designing out waste, pollution & harmful substances. Read more at the [Ellen MacArthur Foundation](#)

CONDITIONS: circumstances affecting how people live & work in regard to their safety & livelihoods

DEADSTOCK: pre-consumer excess fabric from production traditionally landfilled or incinerated

DISPLACEMENT: climate changed fueled natural disasters driving forced migration of people & animals

DYEING: naturally or synthetically derived color additives with traditionally intensive water footprints in its consumption & treatment of wastewater

ECOTOXICITY: the ability of chemicals utilized in textile processes to have a toxic impact on organisms & their environment

EMPLOYMENT SECURITY: protections that provide workers stability from threats such as short-notice dismissal

ENDOCRINE DISRUPTION: synthetic chemicals that disrupts the body's endocrine systems in humans & wildlife by blocking or mimicking hormones causing excessive or deficient hormone production

ENVIRONMENTAL JUSTICE: movement toward ending practices disproportionating distributing environmental harms toward BIPOC (Black, Indigenous & People of Color) communities through laws, regulations and policies. Read more at the [Intersectional Environmentalist](#)

EUTROPHICATION: excessive intake of nutrients in a body of water from synthetic pesticide runoff causing dead zones of oxygen depletion, often seen in algae blooms & loss of fish populations

FAST FASHION: model for consuming & disposing fashion styles dependent on rapid production, low prices & high planetary costs

WHILE TERMS WITHIN THESE GUIDES APPLY TO A WIDE ARRAY OF MANUFACTURING PROCESSES, HERE WE DEFINE THROUGH THE LENS OF THE TEXTILE INDUSTRY.

FINISHING: process of applying chemicals on fabrics for performance properties such as antimicrobial or flame retardants **FREEDOM OF ASSOCIATION:** right of workers to join or organize groups that represent their needs

GARMENT CARE: process of caring for textiles that support material longevity & keep toxic ingredients from harming the planet

GREEN WASHING: when corporations, organizations or governments adopt sustainability narratives without taking responsible actions

HEAVY METALS: extremely dense metals such as lead & mercury found in textile dyes, finishes & pesticides with carcinogenic consequences to human health & water systems

HIGG INDEX: scoring tools created by the [Sustainable Apparel Coalition](#) for businesses to measure their sustainability performance

INDIGENOUS RIGHTS: 80% of the world's remaining biodiversity working to curb carbon emissions resides in indigenous communities ([National Geographic](#)). Protecting indigenous rights supports communities & the planet through ensuring community managed land access is not lost to deforestation for monocrop plantations that produce fibers like rayon.

LAND GRABBING: while 70% of all consumed organic crops is still grown by small producers, privatized agribusiness across the world threatens this through land deals without the informed consent of predominantly BIPOC farming communities

LAUNDERING: washing practices of textiles that accounts for ¼ of a garments carbon footprint in its life. Learn more at [Fashion Revolution Project](#)

LIFE CYCLE ASSESSMENT: LCA calculates the inputs, outputs & any environmental impacts of a product from cradle to grave outcomes

LIVING WAGE: wage that covers basic cost of living such as healthcare, food security, education for a worker & their family

LIVING WAGE BENCHMARK: goes beyond a minimum living wage of what localized textile workers need to live by factoring for an income that can support a family above the poverty line with the ability to develop savings

MANUFACTURING RESTRICTED SUBSTANCE LIST & RESTRICTED SUBSTANCE LIST: guidelines for banned or monitored chemicals in manufacturing processes. While many variations of lists exist such as the ZDHC, there is not one unified guideline across the industry

MARINE BIODEGRADABILITY: materials with the ability to biodegrade in aquatic environments without leaving toxic residue

MARKER EFFICIENCY: marking out pattern pieces to minimize the amount of textile waste in cutting

MICROPLASTICS: pieces of plastic smaller than 5mm that shed from textiles through laundering into aquatic environments

NEUROLOGICAL TOXIN: chemicals that are destructive to nerve tissue upon exposure & linked to neurological disorders

POST-CONSUMER MATERIAL: waste generated from end users that cannot be used for the material's original purpose

REGENERATIVE AGRICULTURE: agricultural practices that increases soil organic matter. Learn more at the [Fibershed](#)

SOIL RESTORATION: nourishing eroded or nutrient depleted soil in order to increase soil carbon levels & natural biodiversity

WATER FOOTPRINT: a measurement of the amount of water consumed throughout textile processes including grey wastewater

WATER SCARCITY: lack of freshwater sources due to increasing consumption

WORKER HEALTH & SAFETY: working conditions that protect from organic dust, musculoskeletal stressors, chemical & noise

ZERO WASTE DESIGN: design strategies that create no waste in the making of textile-based product

Additional Resources

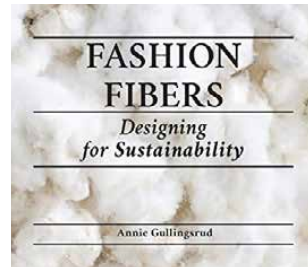
Interested in learning more about making healthier textiles decisions? Check out the Library's favorite resources highlighted throughout this guide:



A New Textile Economy

Ellen MacArthur Foundation

Detailed report that breaks down each component necessary to transition into a sustainable textile industry.



Fashion Fibers

Annie Gullingsrud

Book outlining what designers need to know about working with various fiber types alongside cradle to cradle design exercises.



Urban Dyers Almanac

NY Textile Lab

Archive of natural dye recipes created by students in Laura Sansone of NY Textile Lab's Natural Dyeing course.



Shaping Sustainable Fashion

Alison Gwilt & Timo Rissanen

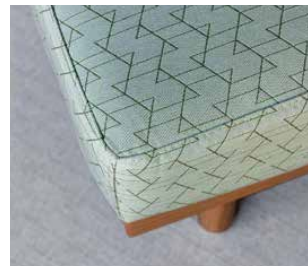
Introduction to needed interventions in sourcing, making, use and waste issues through the lens of innovative designer case studies.



Sustainability Literacy

Slow Factory Foundation

Free crash course covering design approaches that take on the major systems in the fashion industry.



Textile Material Collection

Healthy Material Lab

Collection of healthier textiles and actionable guidelines for working with textiles.



Circular Design Guide

Ellen MacArthur Foundation & IDEO

Workshops, case studies and more circular systems design based resources for students.



Fashion Transparency Index

Fashion Revolution

Ranking 250 of the world's biggest fashion brands and retailers based on their public disclosure of human rights and environmental policies.

Bibliography

“Circular Fashion – A New Textiles Economy: Redesigning Fashion’s Future.” *Ellen MacArthur Foundation*, 2017, <https://www.ellenmacarthurfoundation.org>

“The Dirty Truth behind Our Clothes – Green America’s New Toxic Textile Report.” *Green America*, 2019, www.greenamerica.org/green-americas-2019-toxic-textile-report.

“Fair Labor Association.” *Annual Public Report | Fair Labor Association*, 27 Nov. 2017, www.fairlabor.org/report-type/annual-public-report.

Fair Trade Certified, www.fairtradecertified.org/.

“Flame Retardants.” *Green Science Policy Institute*, 28 July 2015, greensciencepolicy.org/topics/flame-retardants/.

Gots. “OTA (Organic Trade Association) Report: Cotton and the Environment – Global Standard GGmbH.” *Global Organic Textile Standard*, www.global-standard.org/information-centre/news/312-ota-organic-trade-association-report-cotton-and-the-environment.html.

“Good Energy, Bad Energy.” *Friends of the Earth International*, 13 Mar. 2014, www.foei.org/good-energy-bad-energy.

Greenpeace International. “Destination Zero – Seven Years of Detoxing the Clothing Industry.” *Greenpeace International*, 14 July 2018, www.greenpeace.org/international/publication/17612/destination-zero/.

“Higg Product Tools.” *Sustainable Apparel Coalition*, apparelcoalition.org/higg-product-tools/.

“How Much Does Garment Industry Actually Waste?” *Reverse Resources*, 2016, reverseresources.net/news/how-much-does-garment-industry-actually-waste.

“Preferred Fiber and Materials Market Report (PFMR)” *Textile Exchange*, 2020, textileexchange.org/2020-preferred-fiber-and-materials-market-report-pfmr-released/.

“The Price of Fast Fashion.” *Nature News*, Nature Publishing Group, 2 Jan. 2018, www.nature.com/articles/s41558-017-0058-9.

Remy, Nathalie, et al. “Style That’s Sustainable: A New Fast-Fashion Formula.” *McKinsey & Company*, McKinsey & Company, 12 July 2019, www.mckinsey.com/business-functions/sustainability/our-insights/style-thats-sustainable-a-new-fast-fashion-formula.

“Soil Carbon Restoration.” *Northeast Organic Farming Association*, nofa.org/soil-carbon/.

“Textiles: Material-Specific Data.” *EPA*, Environmental Protection Agency, 30 Oct. 2019, www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/textiles-material-specific-data.

Thompson, Rob, and Martin Thompson. *Manufacturing Processes for Textile and Fashion Design Professionals*. Thames & Hudson, 2014.

“UnderMining the Water Cycle – Extractive Industries & a Planetary Water Crisis.” *Gaia Foundation*, www.gaiafoundation.org/post-library/undermining-the-water-cycle/.

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“Everything we make returns to the Earth as either food or poison”

The Slow Factory Foundation