



Innovative Solutions to Fast Fashion Challenges

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Plant Based Products Council

Environmental Law Institute

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About the Plant Based Products Council



- 🌱 Launched in January 2019
- 🌱 Represents companies who are committed to advocating for a shift toward a more circular economy through greater adoption of plant-based materials in consumer products

PBPC Members/Advisors

- 🌱 90 members and growing
- 🌱 All links in the plant-based product supply chain represented:
 - feedstock suppliers
 - polymer manufacturers
 - product manufacturers
 - distributors/suppliers
 - users and retailers
 - consultancies focused on waste diversion, bioeconomy, and sustainability
- 🌱 Supported by Advisory Board of leading environmental organizations, academics, and NGOs (including ELI)

Plant-based Products

Products derived from nature – renewable plant-based material and organic waste matter



And Others...

The move toward plant-based products

Three powerful trends are converging to drive and accelerate the movement toward plant-based products:



Environmental Benefits



Consumer Trends

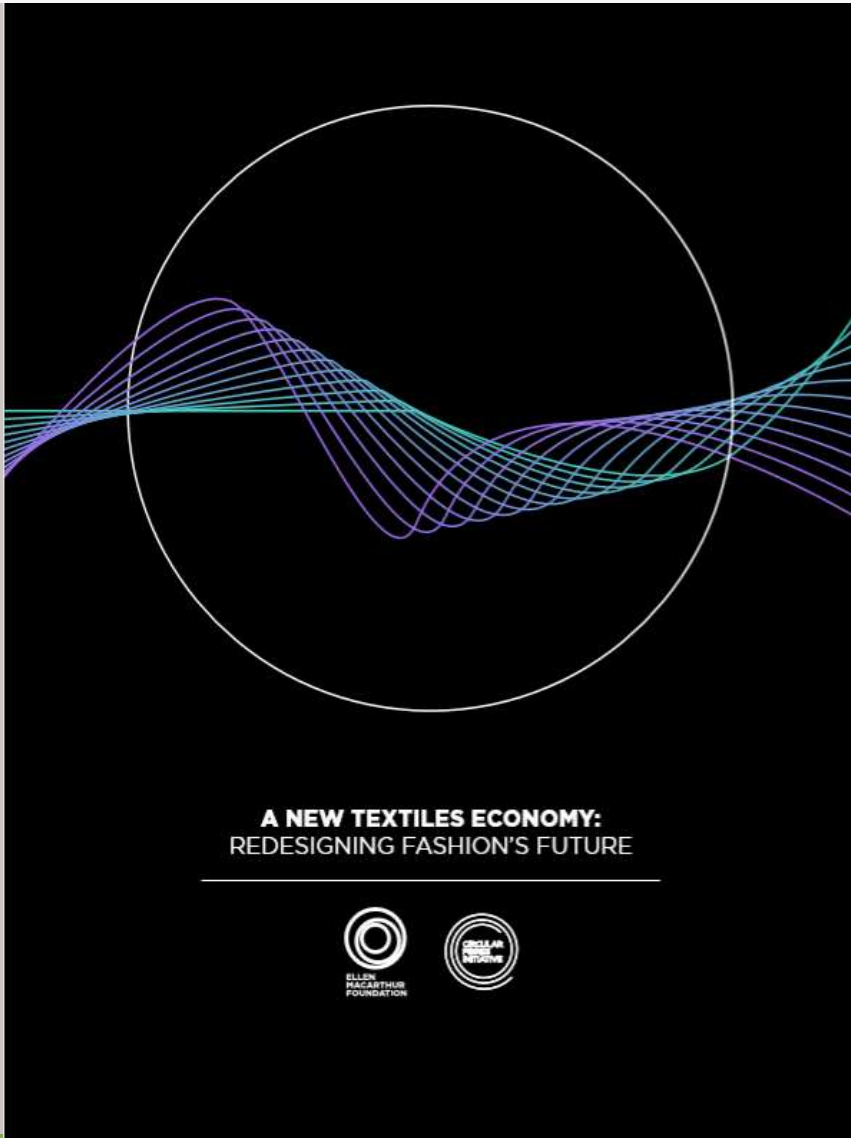


Corporate Pledges

“Where [virgin material] input is needed and no recycled materials are available, it should increasingly come from ***renewable feedstock*** produced in regenerative ways.”

- Ellen MacArthur Foundation's *A New Textiles Economy: Redesigning Fashion's Future*

https://www.ellenmacarthurfoundation.org/assets/downloads/A-New-Textiles-Economy_Full-Report_Updated_1-12-17.pdf



Global material flows for clothing in 2015



2%
recycled
feedstock from
other industries

close
rec

>97%
virgin feedstock

>97%
virgin feedstock
PLASTIC (63%)
COTTON (26%)
OTHER (11%)

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- 🌿 Petroleum is one of many **non-renewable** resources used in the textile industry.
- 🌿 **342 million barrels of oil** are used every year to produce plastic-based fibers (equal to 3 trillion plastic bottles).
- 🌿 Under “business-as-usual” operations, by 2050, the textile industry will comprise **26% of the carbon budget** of a 2°C warming scenario.

Role of Plant-based Materials in Fashion

- 🌿 Alternatives to petroleum-based materials
- 🌿 Alternatives to animal-based materials
- 🌿 Supplements/blends to allow use of less petroleum- or animal-based material
- 🌿 New, innovative materials

Bio-based Plastic Resins Used in Textiles

Bio-based Plastic Resin	2019 Global Production Capacities (in million lbs)
PTT (polytrimethylene terephthalate) (partially bio-based)	353
PLA (polylactic acid)	134
Bio-PET (polyethylene terephthalate)	22

- 🌱 Bioplastics represent ~1% of the 350M+ tons of plastic produced annually.
- 🌱 ~5% of bioplastics are used in textile applications.
- 🌱 Derived mainly from corn and sugarcane

Bioplastics market data 2019. European Bioplastics. <https://www.european-bioplastics.org/market/>

Benefits of Plant-based Materials

Benefits vary by feedstock, but examples include:

- 🌿 CO₂ absorption during plant growth phase
- 🌿 CO₂ sequestration in soil by plant
- 🌿 Reduced reliance on fossil fuels
- 🌿 Reduced use of animal-based materials
- 🌿 Reduced greenhouse gas emissions in production
- 🌿 Equivalent performance
- 🌿 Wide range of disposal options across materials

Examples of Plant-based Materials

Bio-polyester (Virent)

- Raw material for polyester (paraxylene) made from 100% renewable, plant-based resources.
- Variety of feedstocks (beet sugar, sugar cane, corn starch, bagasse, corn stover, grasses, sorghum and wood).
- Performs identically to traditional polyester because it is chemically identical

Plant-based down insulation (PrimaLoft and others)

- Made using fluffy, lightweight fibers from pods of kapok trees.
- Provides excellent heat storage and moisture management.
- Blended with other materials (e.g., fibers from PCR PET).



Examples of Plant-based Materials

Biobased Fibers – Example: DuPont Sorona

- Performance fibers
- 37% renewably sourced by weight
- 30% less energy and 63% fewer greenhouse gas emissions (compared to the production of nylon 6)

Shoes

- Pineapple leaf fiber, linen, kenaf, lactae hevea, cotton (Native Shoes)
- Eucalyptus, algae, natural rubber, castor beans (Reebok)



Photo: Reebok

<https://www.reebok.com/us/blog/438228>

Examples of Plant-based Materials

Hemp textiles

- Natural antimicrobial properties; durable; breathable
- Requires less water, pesticides, fertilizers than cotton
- Doesn't deplete soil
- High CO₂ absorption and fast growing

Textiles from fruit residue (pineapple skins, orange peels)

Additional examples

- Soy cashmere
- Mushroom, apple skin leather
- Bamboo textiles

Examples of Plant-based Materials

Fasteners

- YKK zippers from molasses
- Bioplastic buttons

Dyes

Packaging

Additional Considerations

- Does not compromise food availability or require a significant amount of agricultural land to grow.
 - 0.05% of the world's arable land is used to produce plant-based plastics.
 - With current market trends, will only increase to ~0.07% by 2024.
 - Large diversity of plant-based feedstocks.
 - Some products are derived from non-edible plants/plant parts or ag residue.
- Employment of sustainable management practices such as no-till and cover cropping reinforce the positive environmental merits of the industry.
- Often more expensive
- Check for certifications (e.g., USDA BioPreferred, bluesign)

Conclusions

- Plant-based materials present significant opportunity to move the fashion industry away from petroleum to a more circular construct.
- Innovation abounds from feedstock to end-product.
- These materials offer a variety of environmental benefits.
- As nascent products, many challenges are to be tackled to facilitate widespread adoption of plant-based products.

Questions?

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