



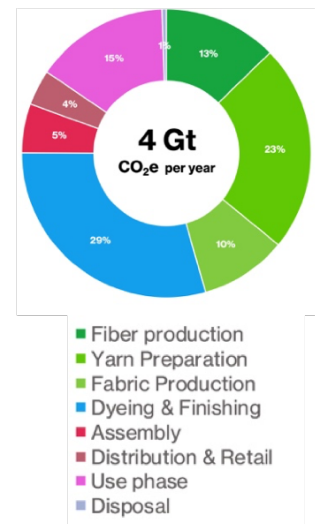
# Emissions Reduction Through Innovation in the Textile Industry

## THE PROBLEM

Textiles touch every human on the planet—quite literally. The textile industry is a global enterprise with a massive carbon footprint. Collectively, textiles are responsible for 4 Gt of CO<sub>2</sub> equivalent (CO<sub>2</sub>e) per year, or 5–10% of global greenhouse gas (GHG) emissions—more than aviation and maritime shipping combined. Some of these emissions are due to the energy-intensive nature of processes involved with fiber production, fabric finishing, and laundering, but also the sheer volume of products manufactured and consumed each year is wasteful and generates unnecessary emissions.

To move the needle on climate change, a collective of researchers at MIT proposes to significantly reduce GHG emissions in the textile industry through groundbreaking innovations in science, technology, operations, and business practices, areas in which MIT is a world leader.

Global apparel industry emissions



## OUR SOLUTION

Mitigating GHG emissions in the textile industry requires progress on many fronts. Our focus is the emissions that relate to the selection, sourcing, design, manufacture, and use of textiles. We see opportunities to reduce the energy intensity of textile processes through paradigm changes in material selection and production, to increase material efficiency and reduce reliance on petroleum-based feedstocks. We can reduce the volume of textiles manufactured and consumed each year through customization and design of products that promote greater utilization and circularity, and through interventions that encourage responsible consumer behavior. Our broad, multifaceted program has five components:

1. **Sustainable Materials:** textiles using nontraditional, carbon-negative polymers from biomass; additives that facilitate recycling
2. **Re-thinking Manufacturing:** processes to structure fibers and fabrics for performance, reduce waste, and increase material efficiency
3. **Design of Textiles for Value:** smart products that are customized, adaptable, and multi-function and that interact with their environment to reduce energy consumption
4. **Behavior Change:** human interventions that reduce emissions by encouraging adoption of new technologies, increased utilization of products, and circularity
5. **Carbon Transparency:** systems-level analyses that reveal impactful strategies for emissions reduction

## OUR TEAM

Our team consists of fourteen faculty and research scientists from MIT's Schools of Science, Engineering, and Architecture as well as Sloan School of Management. They bring together expertise in the science and engineering of materials and products; the psychology of consumer behavior; and assessment of life cycle, technoeconomic, and market-wide changes in textiles to tackle this challenge.

## NOW IS THE TIME TO ACT

The textile industry is growing rapidly, with consumption projected to reach 102 million tons by 2030. Under business as usual, emissions from the textile industry will increase 30% by 2030. A reduction in global emissions by 730 Mt CO<sub>2</sub>e/year by 2030 constitutes 5% of the reduction required to limit global warming to 2°C. Importantly, several global trends are creating an opportunity to make transformative change now, even where investment is required. These include pressure from consumers for apparel firms to be sustainable and transparent, and increasing uncertainty about supply chain resiliency. Additionally, as stipulated by the UNEP Emissions Gap Report 2020, the unprecedented scale of COVID-19 economic recovery measures presents a unique opportunity for a low-carbon transition that creates the structural changes required for sustained emissions reductions.

At MIT, our strength is our people—the students and their mentors—and the innovations that come from creative minds and interdisciplinary collaboration. Industry has a crucial role to play in examining and beta-testing these innovations and, where feasible, implementing at scale for impact. We seek forward-looking manufacturers and trendsetters who can lead the way; startups and entrepreneurs who seek disruptive change in the textile space; and thought leaders from philanthropic and related organizations with the vision to imagine the reductions in GHG emissions possible when consumers, innovators, and industry come together for a common purpose.

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