ENVIRONMENTAL FACT SHEET

THE PROBLEM

The materials that make up our daily lives, from our clothes to our car seats, have a profound impact on the environment. The fashion industry alone, which makes up only a fraction of the total materials market, is responsible for up to 10% of anthropogenic greenhouse gas emissions. According to the Ellen MacArthur Foundation, textile production will take up more than a quarter of the global carbon budget by 2050 if left unchecked.

THE MATERIAL INNOVATION INITIATIVE

The Material Innovation Initiative is a global nonprofit that is striking at the roots of the material industry’s sustainability problem by accelerating the development of sustainable next-gen materials for the fashion, automotive, and home goods industries, with a focus on replacing animal-based materials. We believe that technological innovation and untapped natural materials can solve the enormous challenges facing the materials industry.

66–80% of a brand’s environmental footprint comes from its choice of raw materials

MII partners with scientists, startups, brands, and retailers to bring high-performance, eco-friendly, and animal-free materials to market. We also work to shrink the environmental footprint of existing fibers and improve the circularity of commonly used alternatives to animal materials. Our main focus is the global development of new material technologies which produce markedly less environmental destruction, such as precision fermentation, cell cultivation, microbial cultivation, and mycelial growth. The possible applications of these technologies are widespread, with the potential to replace or improve all materials currently used in fashion.

1 https://www.weforum.org/agenda/2020/01/fashion-industry-carbon-unsustainable-environment-pollution/
I'm convinced that technical innovations will be the solution to many of the environmental challenges the textile industry is facing and will contribute to a more sustainable consumption. – Karl-Johan Persson, H&M Group

Animals, Materials, and the Planet

The need for next-gen materials and technology is dire. Without suitable replacements for the most environmentally damaging materials, we will be unable to avert the material industry’s path toward irreparable climate harm. Assessments consistently show that animal-derived materials rank among the worst for the environment across a broad range of categories, including greenhouse gas emissions, water use, and eutrophication. The process of breeding and raising animals for their skin, hair, or feathers requires tremendous amounts of resources and produces significant waste throughout the production process. For instance, it’s estimated that more than 3,600 gallons of water are required to make just one pair of leather shoes, a number which pales in comparison to the water use of silk, the “thirstiest” material\(^3\). The leather tanning process uses more than 250 chemicals, including arsenic, lead, formaldehyde, and chromium, a known carcinogen that produces highly toxic runoff. Sheep raised for wool production have an even greater climate impact per animal than the cows raised for leather production due to their high methane production, which has 25 times the radiative force of an equal mass of carbon dioxide\(^5\). The mounting impacts of animal-derived materials are impossible to ignore.

It’s commonly but mistakenly believed that animal-derived materials are “byproducts” of the meat industry. However, leather is a significant profit-driver for industrial animal agriculture as the second most valuable product from the cow, and in the case of silk, down, wool, and exotic skins, the materials are the most profitable products. As such, animal-derived materials share responsibility for the myriad environmental harms of industrial animal agriculture, which is the leading driver of deforestation, biodiversity loss, and land degradation globally\(^6\). To ensure a livable future and protect against the existential risk of climate change, it’s critical that the materials

[^4]: https://portal.higg.org/
[^5]: https://portal.higg.org/
[^6]: https://www.epa.gov/gmi/importance-methane
[^6]: http://www.fao.org/3/a-a0701e.pdf
industry moves away from animal-derived materials. As it stands, these materials are poised for significant growth in the coming years:

- “The global wool yarn market is expected to be valued at nearly US$ 33,500 million in 2019, and is projected to grow at a CAGR of over 4% over the period of 2019–2029.”
- “The global leather goods market size was valued at USD 414 billion in 2017 and is anticipated to progress at a CAGR of 5.4% in the coming years.”
- “The global silk market is projected to reach USD 16.94 billion by 2021, at a CAGR of 7.8% from 2016 to 2021.”
- “Down Feather Market is valued at USD 5.9 Billion in 2017 and is expected to reach USD 10.25 Billion by the end of 2025, growing at a CAGR of 7.5% between 2017 and 2025.”

**Data-Driven Solutions**

Data is our best argument for catalyzing change in the materials industry. Unreliable, outdated, or sparse data is a principle challenge that has impeded efforts to improve sustainability. Without the ability to effectively benchmark progress, it’s difficult to distinguish between meaningful efforts and marketing campaigns, and to determine which technologies or materials have show the greatest promise as sustainable solutions. One of the most widely used and most respected data sets on environmental impact in the fashion industry, the Higg Index, is not fully transparent and often compares apples to oranges while making claims about relative impacts of materials, leaving the results up for dispute. Additionally, The Higg Index only includes data from one next-gen material startup, the results of which are impossible to generalize across this nascent and diverse market sector.

“We need a landscape assessment of the data and an analysis of the gaps and inconsistencies that’s crisp, and then a call for funding the research to fill those gaps. Then we’d be making progress.” - Dr. Linda Greer, Senior Global Fellow at the Institute of Public & Environmental Affairs

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7 https://www.persistencemarketresearch.com/market-research/wool-yarn-market.asp
8 https://www.grandviewresearch.com/industry-analysis/leather-goods-market#:~:text=The%20global%20leather%20goods%20market
9 https://www.marketsandmarkets.com/Market-Reports/silk-market-110379892.html#:~:text=The%20global%20silk%20market%20is
10 https://www.profsharemarketresearch.com/down-feather-market-report/
In spite of the paucity of data, initial sustainability assessments of next-gen materials and technologies show remarkable promise. Piñatex, the startup assessed in the Higg Index, creates its leather alternative out of waste from pineapple harvesting, drastically reducing the impact of its raw material sourcing. Natural Fiber Welding, a startup using a proprietary mechanical process to produce a high-performance leather alternative without the use of any petroleum-based inputs, is entirely biodegradable, fully recyclable in their facility, and has remarkably small water and energy requirements in comparison to bovine leather\textsuperscript{11}. However, these initial assessments are not sufficient to drive the kind of investment required to change the course of the materials industry.

The fashion industry is poised for change and many brands are actively looking for more sustainable materials. MII has spoken with more than 40 of the top fashion and automotive brands, most of which will not make the switch to new materials without reliable sustainability data. Unfortunately, most of the next-gen material companies are not in the financial position to pay for or prioritize LCAs. In order to make intelligent decisions, industry needs to be able to compare next-gen materials to each other, which will be impossible without consistent LCA processes. MII is in the perfect position to fund, conduct, and publicize this research. Please reach out to our teams if you would like to be involved.

Given the urgency of the environmental challenges we face today, it is necessary for us to reimagine material production from the ground up and build an industry that is fundamentally more sustainable. Change on this scale will be impossible without clear data to guide the industry toward a better future.

Visit materialinnovation.org for more information on our work and mission.
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\textsuperscript{11} Natural Fiber Welding company report available from MII upon request