Taking Stock of Progress Against the Roadmap to Net Zero 2025

Annual Apparel Sector Greenhouse Gas Emissions: Calendar Year 2023

apparel impact institute

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Content

1. Executive Summary

According to the Copernicus Climate Change Service, 2024 was the warmest year on record, and the first calendar year in which the average global temperature exceeded 1.5°C above pre-industrial levels. The 10 warmest years on record have been the last decade (2015 to 2024). We see the impacts of a changing climate on a regular basis in countries central to the apparel industry - extreme heat in India, flooding in Pakistan, intensifying cyclones in Bangladesh, to name a few. The world is not moving fast enough to reduce greenhouse gas (GHG) emissions, and the planet's most vulnerable people are most at risk.

Based on our latest estimate of apparel sector GHG emissions, the apparel sector is also not moving fast enough. In 2023, apparel sector emissions increased 7.5 percent from the previous year, to 944 million tonnes (roughly 1.78 percent of global GHG emissions). This marks the first significant increase since 2019, when Aii began calculating emissions. The primary reason for the increase in emissions is a growth in polyester fiber usage (and ultimately garment production). While our methodology limits the attribution we can make to any specific company or category, we assume that the rise of ultra-fast fashion brands is a key contributor to this increase. Tier 2 - textile processing - remains the largest source of emissions (55 percent), followed by raw material production (22 percent).

While this increase in emissions is discouraging, we are optimistic about the foundational changes we are seeing in the sector, and many examples of brand and manufacturer leadership. We are witnessing shifts in energy policy in key source countries such as Vietnam, and momentum is starting to build on alternatives to coal for thermal energy. Significant capital is flowing to material innovators, with the promise of creating breakthrough sustainable materials. There are now over 600 companies in the apparel sector with approved climate change targets or commitments to set them via the Science-Based Targets initiative, making apparel amongst the leaders across all sectors.

And we are seeing real progress by individual companies - for example, brands reducing scope 3 emissions on an absolute basis, manufacturers phasing out coal boilers, and companies significantly increasing their use of lower carbon materials such as recycled polyester. We provide specific examples in the report below.

As noted in the first *Roadmap to Net Zero* report, Aii publishes this update to take stock of progress. Our hope is that the report provides an objective take on how the sector is faring in reducing GHG emissions, and shares examples of progress that might inspire the sector to go bigger and faster.

2. Context

In November 2021, Apparel Impact Institute (Aii) and World Resources Institute (WRI) published *Roadmap to Net Zero: Delivering Science-Based Targets in the Apparel Sector*. In this report, Aii and WRI provided an estimate of apparel sector greenhouse gas (GHG) emissions for 2019, and identified the key steps the sector must take to reduce emissions in line with a 1.5°C pathway (i.e., keeping temperature increase to no more than 1.5°C above pre-industrial levels). In the *Roadmap*, Aii and WRI shared their intent to refresh the calculation of apparel sector GHG emissions on an annual basis, factoring in any changes in the underlying data and assumptions. This annual update would enable the industry to gauge progress on its collective goal to reduce emissions by 45 percent by 2030 (from 2019 levels).

With this report, Aii is providing an estimate of GHG emissions for 2023 using fiber volume data from Textile Exchange for 2023 and GHG impact data from the Higg Material Sustainability Index (MSI), a product of Cascale and Worldly. Aii believes these data sources are the most widely used and representative in the apparel sector, and thus we have used them in the *Roadmap* and the prior two annual updates. Note that Aii and WRI discussed the benefits and limitations of these data sources in the original *Roadmap* report. As a reminder, given our data sources, there is a lag between the emissions estimate and report publication. Thus, this report, published in 2025, is based on 2023 data.

Report	Publication Date	Data Year
Roadmap to Net Zero: Delivering Science-Based Targets in the Apparel Sector (link)	November 2021	2019
Taking Stock of Progress Against the Roadmap to Net Zero (link)	June 2023	2021
Taking Stock of Progress Against the Roadmap to Net Zero 2024 (link)	June 2024	2022
Taking Stock of Progress Against the Roadmap to Net Zero 2025 (this report)	July 2025	2023

UPDATE ON SCIENCE-BASED TARGETS IN THE APPAREL SECTOR

Since the inaugural report, we have been tracking the number of apparel, footwear, and textiles companies that have approved science-based targets or commitments to set them (via the Science-Based Targets initiative). When the SBTi published guidance for the apparel sector in 2019, there were roughly a dozen such companies. This increased to approximately 100 when the *Roadmap* was published in November 2021, 400 by May 2023, and over 500 by April 2024.

As of April 2025, there were over 600 apparel, footwear, and textiles companies with approved science-based targets or commitments to set them. This is a welcome trend, illustrating the apparel sector's leadership among all sectors in addressing climate change. For the full list, visit https://sciencebasedtargets.org/target-dashboard

3. Methodology: Calculating Apparel Sector GHG Emissions

In calculating apparel sector GHG emissions for 2023, Aii maintained the same approach used in previous reports. We started with fiber weight data compiled by Textile Exchange in its *Materials Market Report 2024* (published in September 2024), which covers global production weights of the various fibers and materials used in textiles in 2023.[1] For each fiber type, we used Textile Exchange assumptions on the share used in apparel versus other categories such as home textiles, as shown in Table 1.

For each fiber type, we multiplied the allocated total fiber weight by the GHG emissions factors for each process stage in the MSI:

- Raw material, such as cotton farming to gin
- Yarn formation, or spinning fiber into yarn
- Textile formation, such as knitting or weaving yarn into fabric
- Preparation, such as scouring
- Coloration
- Additional coloration and finishing, including heat setting

Table 1: Fiber Allocation to Apparel

Fiber	Percentage Allocation to Apparel
Cotton	70%
Wool	45%
Down	25%
Viscose	50%
Lyocell	50%
Modal	50%
Polyester	55%
Nylon	46%
Acrylic	75%
Elastane	67%
Polypropylene	67%
Hemp	1%
Flax	60%
Silk	90%
Alpaca	95%
Jute	1%
Acetate	5%

[1] We use "weight" for consistency with previous reports. Textile Exchange uses "volume" in their *Materials Market* reports - these terms are synonymous for the purposes of the calculations.

Since the MSI does not include data on finished goods production (Tier 1), we used a simplified process from Quantis' World Apparel & Footwear Life Cycle Assessment Database (WALDB) as a proxy. As with the previous reports, we excluded emissions from the following sources because they are minimal and / or difficult to estimate. See the *Roadmap* and subsequent reports for further explanation.

- Corporate offices and other buildings
- Consumer use
- End of life
- Downstream transportation

Our calculations use refreshed MSI data, the details of which can be viewed in the last two change logs: Version 3.9.1 (December 2024) and Version 3.9 (October 2024). As described in the change logs, all global warming midpoints and scores have changed due to the update to the LCA for Experts (formerly known as GaBi) database. Some notable revisions include:

- Updated background electricity grid, affecting all processes but especially those that rely heavily on electricity (yarn spinning and textile formation)
- Updated background energy updates for various synthetics, including polypropylene
- Updated heat setting model boundaries and data for preparation and finishing

3.1 Definition of Tiers and Assumptions

3.1.1 Raw Material Extraction

Scope: Emissions related to extracting fossil fuels for conversion into synthetic fibers and growing natural fibers such as cotton and wool.

According to the *Materials Market Report 2024*, approximately 124 million tonnes of fiber were produced for textiles in 2023, up from around 116 million tonnes in 2022. Based on the fiber percentage allocations shown in Table 1, the starting point for fiber used in apparel was 68.17 million tonnes.

Polyester was the most used fiber type in 2023, representing 57 percent of total global fiber Production. Cotton was second at 20 percent, followed by man-made cellulosic fibers (MMCF) at 6 percent, and nylon at 5 percent. Aii's analysis excludes leather as we only evaluated apparel and not footwear.

For Tier 4, we multiplied the weights of each fiber type by the corresponding emissions factor from the MSI and summed these for the Tier 4 figure.

3.1.2 Raw Material Processing

Scope: Spinning fiber into yarn

Our analysis focused on spinning fibers into yarn and did not include the processing of other intermediate materials, such as metal for zippers, as that data is not readily available. Our goal is to include more of these trims and other inputs in future analyses.

We made the following assumptions for converting fiber into yarn:

Table 2: Assumptions for Yarn Types

Fiber	Assumptions
Polyester	67% filament yarn 33% staple fiber ring spun yarn
Nylon	90% filament yarn 10% staple fiber ring spun yarn
Polypropylene	60% filament yarn 40% staple fiber ring spun yarn
Acrylic	100% staple fiber ring-spun yarn
MMCF (Viscose Rayon, Modal, Lyocell)	100% staple fiber ring-spun yarn
Cotton	75% staple fiber ring spun yarn 25% staple fiber rotor spun yarn
Wool	100% staple fiber ring-spun yarn

We assumed yarn density of 200 decitex for all fiber types and used the same fiber loss rates as in previous reports.

3.1.3 Material Production

Scope: Textile formation, preparation, coloration, and additional coloration and finishing.

Our analysis for Tier 2 covered:

- Textile formation (knitting or weaving yarn into fabric)
- Preparation, such as scouring
- Coloration
- Additional coloration and finishing, such as heat setting

We assumed 40 percent knit and 60 percent woven for all fiber types for textile formation. For preparation, we applied default MSI emissions factors for each fiber type. The sources for these emissions factors can be found in the public version of the MSI. For coloration, the default MSI emissions factors were again applied for each fiber type:

- Synthetic fibers: Batch dyeing with disperse or cationic dyes
- Cotton and MMCF fibers: Batch dyeing with direct, sulfur, vat, or reactive dyes
- Wool: Batch dyeing with acid dyes

Companies wanting to refine their analysis can select specific coloration methods in the MSI.

As with Tier 3, calculations use fiber loss rates from the MSI (via Textile Exchange) for Tier 2.

3.1.4 Finished Goods Manufacturing

Scope: Final assembly of products, including cutting and sewing of fabric into garments.

We calculated finished goods manufacturing emissions using a standard emission factor per kilogram of finished product, based on data from Quantis' WALDB. The process includes GHG impacts from electricity consumption (80 percent of the GHG impact), thermal energy, and minor sources such as tap water. Calculations used the electricity mix representing the top apparel manufacturing countries, which is consistent with the MSI.

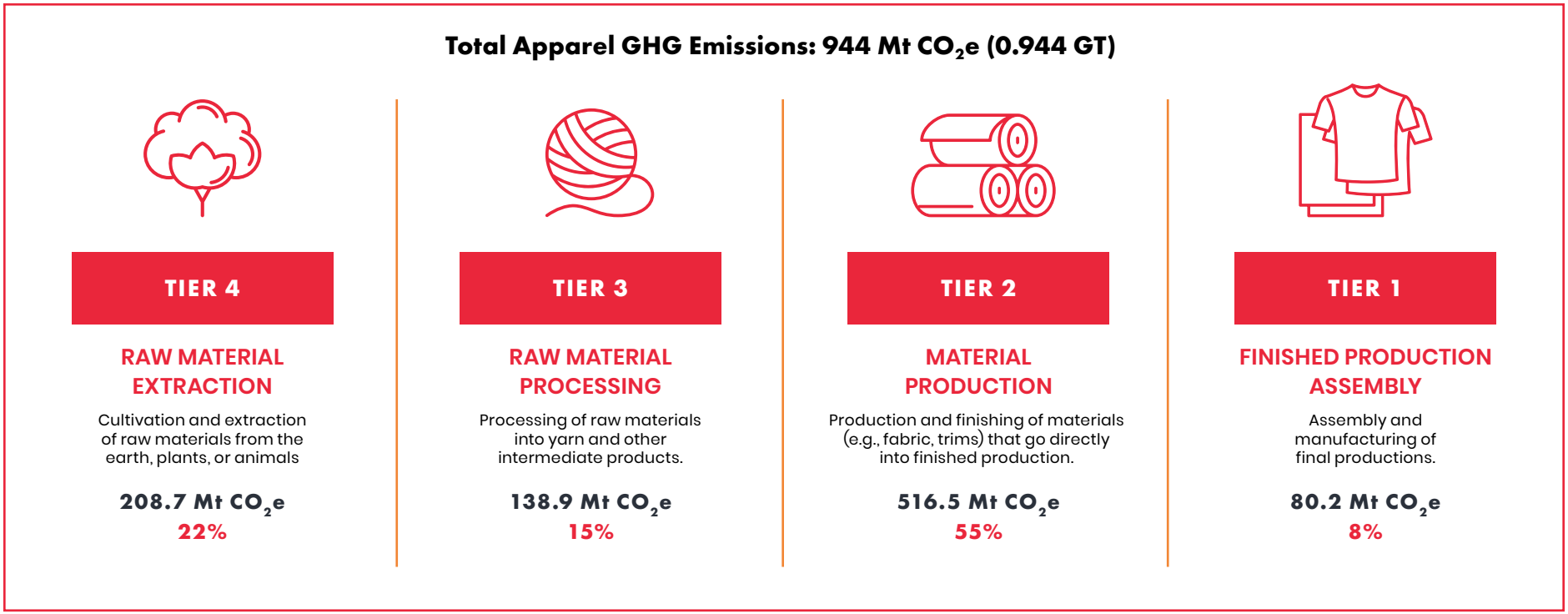
In our calculations, we assumed an average fabric loss rate of 20 percent for finished goods.

4. Results

Given the above assumptions, we estimated total apparel sector GHG emissions for 2023 to be 944.24 Mt CO_2e, or 0.944 Gt. This is an increase of 7.5 percent from 2022, which was largely driven by an increase in fiber consumption, primarily polyester.

Based on global annual GHG emissions of 53 Gt[2], the apparel sector's 2023 figure represents 1.78 percent of the total. The percentage breakdown of emissions across the value chain was nearly identical to 2022, as illustrated in Figure 1.[3]

Figure 1: Emissions Breakdown Across Tiers, 2023



Note: 1 million tonnes = 1 million tonne (Mt), 1 billion tonnes = 1 gigatonne (Gt)

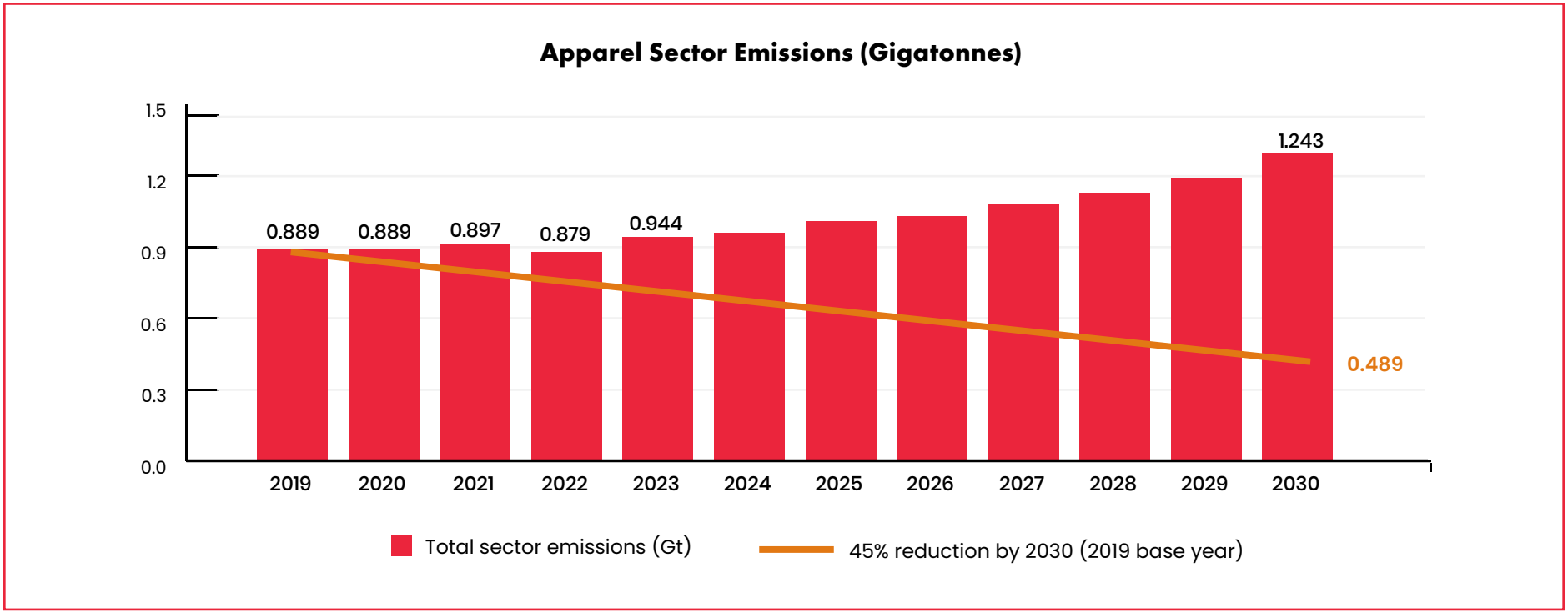
[2] Source: EDGAR - Emissions Database for Global Atmospheric Research (2023 data)

[3] This value chain segmentation is consistent with that of the Supply Chain Taxonomy for the Textile, Apparel, and Fashion Industry.

As noted in our previous reports, given the state of impact data in the apparel sector, our result (0.944 Gt) is a reasonable but not definitive estimate of apparel sector emissions. We believe our result is the best estimate of sector emissions, and we will continue to work on gathering better data to refine our calculations in the future.

Assuming business-as-usual growth for the sector, emissions are projected to be 1.243 Gt in 2030. This reflects annual growth rates of 5 percent for synthetics and MMCF and 1 percent for cotton and other natural fibers.[4] To stay within a 1.5°C trajectory — achieving a 45 percent reduction by 2030 — the sector would need to reduce emissions from 0.944 Gt in 2023 to 0.489 Gt by 2030 - and more if we are to achieve net zero by no later than 2050.

Figure 2: Historical and Projected Emissions for the Apparel Sector



The 2030 forecast published in the 2024 report (1.243 Gt) has been updated to 1.194 Gt. The revision corrects a date shift in the underlying data and aligns the forecast with the intended timeline.

[4] We used the same growth assumptions in previous reports.

5. Progress in Decarbonizing the Apparel Sector

5.1 Challenges Remain

Given the imperative to reduce the apparel sector's GHG emissions, an increase of 7.5% is an unwelcome development, even after several years of flat to slightly declining emissions. For context, global GHG emissions (from all countries and sectors) hit a record high in 2023 at 53 Gt.

The barriers to decarbonizing the apparel sector remain essentially the same as when we published the initial *Roadmap*:

- Access to finance for manufacturers to invest in solutions such as energy efficiency and renewable energy can be limited for a number of reasons, including macroeconomic factors (e.g., higher equity risk premiums) and sector-specific factors (e.g., the transactional nature of brand / manufacturer relationships makes debt financing for manufacturers risky).
- Related, brands have historically not been willing to co-fund decarbonization solutions in their supply chain (e.g., through sharing the costs of investments in technology or paying more for goods over time).
- Renewable electricity is not available at scale or affordable in key manufacturing countries. However, this is starting to change in Vietnam and other countries.
- Alternatives to coal for thermal energy are nascent or costly, though, as with renewable electricity, this is starting to shift in some countries.
- Current options for sustainable materials, such as recycled polyester, cost more than their virgin counterparts. This is a key reason why the share of recycled polyester of all polyester declined from 2022 to 2023. In the case of polyester and other synthetics, the declining price of oil and gas over the last several years has made recycled alternatives more costly on a relative basis.
- Regarding next-generation materials (e.g., textile recycling), we cite below several promising innovators and investment trends. However, these materials face the same cost premium challenge as currently available alternatives, and have the additional challenges of developing and scaling new materials.
- Circular business models such as rental, resale, and repair have the potential to reduce emissions if they displace the production of new apparel.[5] However, such models remain an insignificant portion of the industry due to logistics, consumer behavior, and cost challenges.

Since the last *Roadmap* refresh report, we have seen rapid growth of so-called ultra-fast fashion brands, which are driving greater consumption of apparel. To illustrate, by one estimate, Shein's revenue was under $1B in 2016, and reached over $30B in 2023.

[5] In February 2025, WRAP published a revised estimate of the so-called displacement rate for apparel circular business models. For example, it proposes that for every five items purchased via resale platforms, three of these displace new purchases.

5.2 Reasons for Optimism

This said, there are some reasons to be cautiously optimistic about efforts to reduce apparel sector emissions. For example:

A growing number of brands are reducing scope 3 emissions - which are the vast majority of their total emissions. These include:

- **H&M** reduced Scope 3 emissions 23% from 2019 to 2024.[6]
- **Fast Retailing** (parent company of Uniqlo) reduced purchased goods and services (PG&S)[7] emissions by 18.6% from 2019 to 2024.
- **Puma** reduced PG&S emissions 17% from 2017 to 2024.
- **Inditex** reduced PG&S emissions 8% from 2018 to 2024.

An increasing number of manufacturers are reducing Scope 1 and 2 emissions. For example:

- **Elevate Textiles** reduced Scope 1 and 2 emissions 35% from 2019 to 2023.
- **Artistic Milliners** reduced Scope 1 and 2 emissions 52% from 2020 to 2023.
- **MAS Holdings** reduced Scope 1 and 2 emissions by over 20% from 2019 to 2023.
- **Shenzhou International Group Holdings** reduced Scope 1 and 2 emissions 16.8% from 2020 to 2024, and has a target of 42% by 2030 (same base year)
- **Far Eastern New Century** reduced Scope 1 and 2 emissions 25% between 2020 and 2023.

Legislation in various regions will require companies across sectors, including apparel, to measure and reduce GHG emissions in line with science.

- In Europe, the Corporate Sustainability Reporting Directive will require[8] companies to report on their efforts to reduce emissions and mitigate climate risk, in line with a 1.5ºC warming limit. The Corporate Sustainability Due Diligence Directive will require[9] companies to set science-based climate targets and develop decarbonization plans.
- California will mandate disclosure of GHG emissions for companies with $1B or more in revenue doing business in California, starting in 2026 for Scopes 1 and 2, and 2027 for Scope 3 emissions. While this is most directly applicable to brands selling products in California, the Scope 3 requirement will indirectly apply to manufacturers making these products for brands.
- Countries including Canada, Japan, and Australia have (or will soon have) mandatory climate reporting requirements for companies listed on local stock exchanges.

[6] While the sector GHG estimate is based on 2023 data, we cite the most recent year for which data is available. The intent is to highlight recent progress.

[7] For brands, emissions from purchased goods and services are the vast majority of scope 3 emissions, which in turn are most of total emissions.

[8] The eligibility requirements for CSRD can be found here. While the European Union has proposed a package of rules that will narrow the scope of the CSRD, the requirements will still apply to many apparel companies (i.e., EU companies with a minimum of 1,000 employees and €450M in revenue and non EU companies with €450M in revenue)

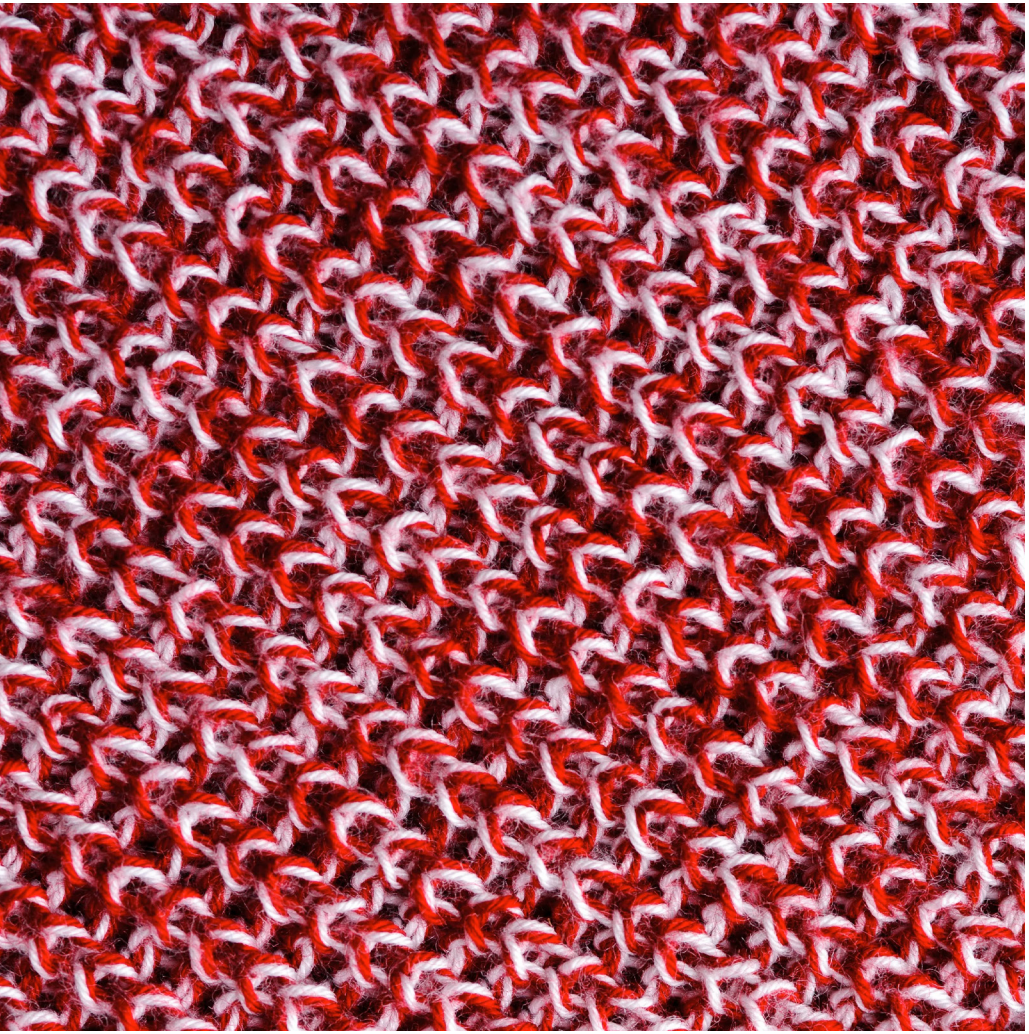
[9] The eligibility requirements for CSDDD can be found here. As with the CSRD, the EU Omnibus package reduced the scope of CSDDD, but many apparel companies will still be covered.

There are a variety of collaborative decarbonization initiatives in the apparel sector. For example:

- Led by Aii and Cascale, the Industry Decarbonization Roadmap is a blueprint for tackling apparel sector supply chain emissions at scale. It includes the development of a carbon intensity benchmark, brand commitments to source from low-carbon facilities, manufacturer engagement, and streamlined data collection and reporting.
- The Manufacturer Climate Action Program (MCAP) helps manufacturers develop and validate science-aligned targets to reduce GHG emissions by 45% by 2030.
- Coordinated by the Fashion Pact, the Future Supplier Initiative aims to reduce the financial burden for manufacturers by working with apparel brands to reduce the cost of capital for loans that can accelerate decarbonisation. The initiative also provides technical support to manufacturers.
- Initiated by Fashion for Good, the Future Forward Factories project aims to transform Tier 2 processing through low-impact decarbonization solutions, including innovative technology and renewable energy.
- Aii's Deployment Gap Grant was co-developed with suppliers and brands to overcome the low adoption of complex decarbonization projects with high-capital expenditure. A $1 million pilot aims to prove its effectiveness and encourage brand co-investment in supply chain decarbonization.

5.3 Case Studies in Decarbonization

In the inaugural *Roadmap* report, we identified six ways in which the apparel sector can reduce emissions in line with science. Below, we share brief case studies of companies and initiatives that are taking action to reduce emissions across these interventions.



CASE STUDIES

5.3.1 Maximizing Material Efficiency

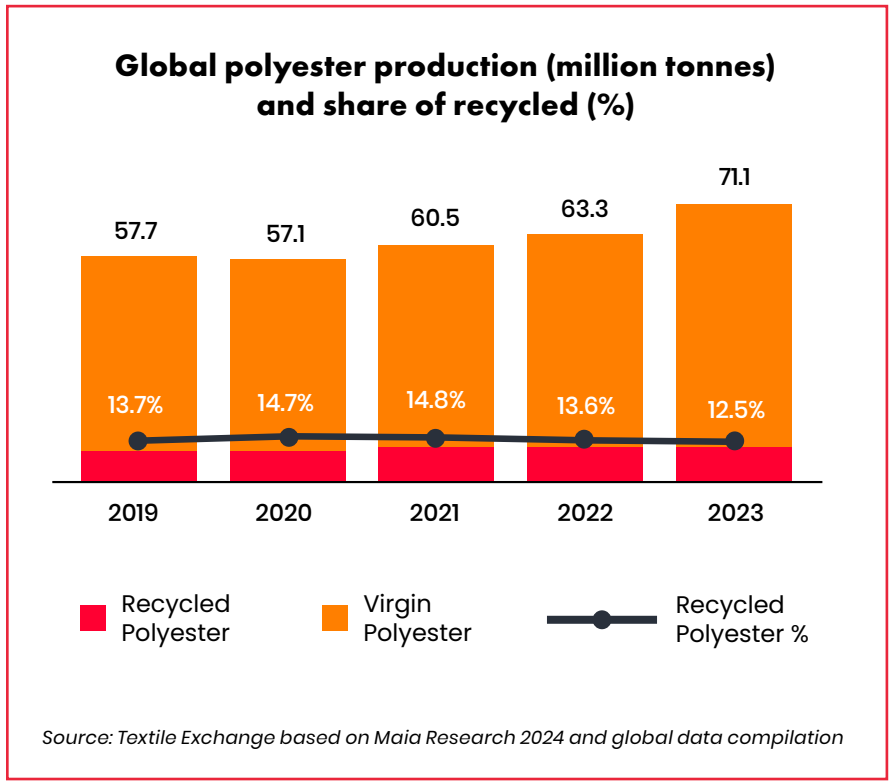
SMARTEX.AI

- Smartex is a technology company that helps manufacturers minimize waste in production by delivering real-time, AI-enabled defect detection and data-driven quality control analysis. As a result, Smartex minimizes the production and shipment of defective fabric, which reduces environmental impact and costs.

CASE STUDIES

5.3.2 Scaling Sustainable Materials and Practices

According to Textile Exchange, at 57% of global fiber production, polyester is the most widely used fiber. The share of all polyester that was recycled was 12.5% in 2023, which is essentially flat over the last five years (range of 12 to 14%).



Source: Textile Exchange based on Maia Research 2024 and global data compilation

While overall industry usage has stagnated, there are bright spots with individual brands and manufacturers:

- In 2024, 99.3% of all polyester used by adidas was recycled.
- In 2024, 94% of all polyester in H&M products was recycled.
- Lululemon hit 61% recycled polyester in 2023, up from 36% in 2020.

The share of recycled materials in other fiber categories is small. For example: 6% for wool, 3% for elastane, 2% for nylon, and 1% for cotton.

Roughly 22% of all cotton was Better Cotton (BCI) or its equivalents (e.g., Cotton Made in Africa). While such cotton has environmental and social benefits, our sector GHG estimate treats BCI cotton as equivalent to conventional cotton with respect to GHG emissions.

CASE STUDIES

5.3.3 Accelerating the Development of Next-generation Preferred Materials

In the initial *Roadmap* report, we noted a category of so-called "next generation" preferred materials, including textile-to-textile recycling and bio-based materials. Compared with currently available materials such as recycled polyester or cotton, these materials are generally in the early stages of development and/or usage, and thus their environmental benefits are not fully clear (though there is an assumption that the benefits are promising). To illustrate, according to Textile Exchange, textile-to-textile polyester recycling is roughly 2% of all recycled polyester,[10] while bio-based polyamide is just 0.5% of all global polyamide.

Ultimately, next-generation preferred materials will need to meet the quality and cost requirements of buyers and be integrated into a complex, global supply chain. But, we are seeing considerable investment in and activity from a variety of innovators. For example:

- **Ambercycle's** first product, cycora®, a recycled fiber from polyester textile waste, is reported to have half the GHG emissions of conventional polyester. To date,
  - Inditex has committed €70 million over three years to buy cycora®
  - Athleta plans to use the material from 2026
  - MAS Holdings has entered into a three-year off-take agreement for cycora®
  - Shinkong Synthetic Fibers Corporation invested $10M in Ambercycle's commercial plant.

- Founded in 2024 by Vargas and H&M, **Syre** aspires to produce 3 million tonnes of circular polyester and abate a minimum of 15 million tonnes of CO_2e by 2032. In April 2025, Syre signed a memorandum of understanding with Binh Dinh province in Vietnam to build a gigascale-sized facility (100k to 250k tonnes of chips per year). This follows news of partnering with Selenis to open a facility in North Carolina, USA, and raising $100M in its series A funding round. H&M has entered into an offtake agreement with Syre to spend $600M over seven years.

- In May 2025, **Circ** announced that it received support from the French government and European Union to build a €450 million textile recycling plant with a capacity of 70k tonnes per year. This follows Q1 2025 news of $25M in new funding from companies including Inditex and Avery Dennison to scale its textile recycling technology.

[10] So, the share of all polyester that is recycled from textiles is 0.25% (2% of 12.5%).

CASE STUDIES

5.3.4 Maximizing Energy Efficiency

- In its 2023 sustainability report, Far Eastern New Century discloses a variety of energy efficiency projects, along with data on emissions and cost savings. For example, retrofitting a steam turbine in the air compressor system to increase steam recovery reduces annual electricity consumption by roughly 7.22 GWh (approximately NT$25.41 million[11] in financial benefits and 3,034 tCO_2e in emissions reduced annually). Overall, in 2023, FENC reduced GHG emissions by over 36 thousand tonnes through production improvement, equipment enhancement, and energy management.
- Epic Group is investing INR 377 million (US$ 4.4 million) to set up a green manufacturing facility in India. It will be designed to be net zero in energy and water usage, and will include low-carbon steel.
- Shenzhou Group has reduced energy intensity (kWh per piece) by 4.7% from 2022 to 2024 through a combination of steps including sourcing energy-efficient equipment and optimizing existing equipment. This work, along with investments in renewable electricity and coal boiler replacement, has allowed Shenzhou Group to reduce Scope 1 and 2 emissions by 24% on an absolute basis from 2022 to 2024.
- Fujian Fortunes Textile & Dyeing Co., Ltd., a fabric manufacturer based in Shenhu, China, has reduced energy consumption 12.96% and greenhouse gas emissions 12.87% through its work with Clean By Design. Energy efficiency measures have included waste heat recovery of condensate from the stenter, improved reclaimed water treatment efficiency, fan motor efficiency, insulation of steam valves and dyeing machines, and adoption of low liquor ratio dyeing machines.

[11] Roughly US$ 842k at an exchange rate of 30.16 NT per 1 $US

5.3.5 Eliminating Coal in Manufacturing

- In 2024, H&M had 27 Tier 1 and 2 suppliers using coal onsite, down from 118 in 2022. H&M has disclosed several case studies of coal boiler removal supported by its Green Fashion Initiative, which include data on GHG reductions.
- Shenzhou Group has a goal of 100% coal phase out by 2030. In 2024, the company had fully phased out of coal in China and Cambodia. Work is advancing in Tier 2 facilities in Vietnam.
- Apparel Impact Institute has commissioned two reports by Global Efficiency Intelligence (GEI) on the potential of low-carbon thermal energy solutions. In the first, GEI evaluated the readiness of major textile-producing countries to adopt low-carbon thermal heating technologies. In the second, GEI presents a roadmap for adopting low-carbon technologies and energy sources in wet-processing in major textile-producing countries.

CASE STUDIES

5.3.6 Shifting to 100 Percent Renewable Electricity

- In November 2024, H&M became the first apparel company to sign a memorandum of understanding (MOU) for a Direct Power Purchase Agreement (PPA) in Vietnam. In March 2024, H&M, in partnership with IFC and Pran Group, also signed the first MOU for a corporate PPA in Bangladesh.
- Renewable electricity was over 60% of Shenzhou Group's total electricity consumption in 2024. This includes 70% in China and 77% in Vietnam for Tier 1 facilities, and 98.5% in China and 30% in Vietnam for Tier 2 facilities.
- Elevate Textiles has reduced energy consumption by 31% and GHG emissions 35% between 2019 and 2023 through a combination of energy efficiency and renewable energy projects.
- Artistic Milliners has invested $100 million into renewable energy generation and has contributed 100 MW of wind power to Pakistan's national grid. Solar energy consumption for operations has increased from 25 GJ in 2020 to over 9,600 GJ in 2023.
- TAL Apparel Group is installing 4.39 MW of rooftop solar in two factories in Vietnam, which will reduce the company's GHG emissions by 8% on an absolute basis.

6. Resources

Below, we present a list of reports, initiatives, and other resources regarding climate action in the apparel sector. This is by no means an exhaustive list. We share these to help the reader learn more and take concrete steps to reduce GHG emissions.

Finance

- *From Catwalk to Carbon Neutral: Mobilising Funding for a Net Zero Fashion Industry Financing Decarbonization (Asia Garment Hub)*: Explores and proposes innovative, equitable funding mechanisms for reducing GHG emissions in the fashion industry, particularly within the supply chain.
- Unlocking the Trillion Dollar Decarbonisation Opportunity (Apparel Impact Institute and Fashion for Good): Maps solutions and breaks down the financing and funders needed to drive net-zero carbon emissions by 2050.
- *Brand Playbook for Financing Decarbonization* (Apparel Impact Institute): Outlines financial strategies brands can undertake to encourage manufacturers to invest in carbon reduction projects.
- *Landscape and Opportunities to Finance the Decarbonization of Bangladesh's Apparel Manufacturing Sector* (Apparel Impact Institute in collaboration with Development Financial International, Inc. (DFI)): Outlines how Bangladesh can close the finance gap and realize its decarbonization potential through strategic finance tools.
- *Landscape and Opportunities to Finance the Decarbonization of India's Apparel Manufacturing Sector* (Apparel Impact Institute in collaboration with DFI): Explores how to mobilize financing and support to decarbonize India's textile and apparel industry.

Policy

- Policy Hub: Convenes brands, retailers, manufacturers, service providers, and stakeholders in the textile value chain to encourage an ambitious European Union policy framework that accelerates the transformation of the apparel and footwear industry towards circularity.
- Asia Clean Energy Coalition: A coalition of global renewable energy buyers, sellers, and financiers, to strategically shift policy in key Asian national and regional markets with the goal of accelerating the demand and supply of renewable electricity across Asia.
- Global Textiles Policy Forum: A platform convened by Global Fashion Agenda (GFA), fostering coordinated policy efforts in response to global textiles legislation. GFA has also published video master classes on policy.

Energy Efficiency, Renewable Electricity, and Thermal Energy

- Climate Solutions Portfolio (Aii): A central hub for suppliers, brands, retailers, industry stakeholders, and commercial financing partners looking to accelerate decarbonization efforts.
- *Low-Carbon Thermal Energy Technologies for the Textile Industry* (Aii and Global Efficiency Intelligence): Explores the readiness of major textile-producing countries to adopt lower-carbon heating technologies, including solar thermal, electrification, sustainable biomass, and natural gas.
- *Low-Carbon Thermal Energy Roadmap for the Textile Industry* (Aii and Global Efficiency Intelligence): Assesses and offers a roadmap for adopting low-carbon technologies and energy sources in wet-processing in major textile-producing countries

Materials

- **Textile Exchange:** Various reports and resources, including annual materials market reports, *Reimagining Growth Landscape Analysis*, and the Fiber and Materials Matrix.

Other

- **Manufacturers Climate Action Program (MCAP):** Managed by Cascale, MCAP helps manufacturers develop and validate science-aligned targets to reduce GHG emissions across the apparel sector and achieve a 45% GHG emissions reduction by 2030.
- **Scandinavian Textile Initiative for Climate Action (STICA):** Supports apparel and textile companies in Scandinavian, European, and international markets to set science-based targets and reduce their GHG emissions in line with a 1.5°C warming pathway. Serves as an independent platform for companies to demonstrate accountability by publicly reporting on their progress and also to learn best practices for reducing emissions.
- Cascale has created a database of organizations and initiatives on climate change.

7. Call to Action and Next Steps

In light of the regular headlines of climate change-driven events around the world, particularly in countries that are essential to the apparel industry, the increase in apparel sector GHG emissions is not welcome news. Apparel production and consumption continue to increase, driven in part by ultra-fast fashion business models. We know that driving large-scale decarbonization across an industry as diverse and expansive as apparel is an incredibly complex, systems-level challenge.

But we also see a growing number of companies, both brands and manufacturers, bucking this trend and reducing their GHG emissions on an absolute basis. These companies are deploying renewable energy at scale, finding alternatives to coal boilers, investing in next-generation materials, and more, taking advantage of the solutions that exist today, and working to advance the solutions of tomorrow.

It's clear the gap between what's needed and what's happening isn't a gap in ideas; it's a gap in action, investment, and scale. That gap won't close on its own. It will take coordinated effort across the value chain, with brands, manufacturers, and funders all stepping up with sharper focus, deeper commitment, and far greater speed.

Our Call to Action

Brands and Retailers

- **Make financing part of the strategy.** Suppliers often face credit constraints that are especially daunting in emerging markets. Brands can help close that gap by contributing financially and leveraging innovative approaches like those outlined in Aii's Brand Playbook for Financing Decarbonization. Joining the Fashion Climate Fund is another way to pool resources and de-risk investments alongside peers, philanthropy, and other partners.
- **Prioritize what works.** Many solutions with verified impact are already featured in Aii's Climate Solutions Portfolio (CSP), an open registry of vetted decarbonization projects. Using the CSP means less time spent searching and more confidence that investments will deliver measurable results.
- **Align sourcing with ambition.** Prioritizing low-carbon suppliers sends a clear, market-shaping signal that influences the rest of the value chain. In support of this shift, Aii and other stakeholders are developing carbon performance benchmarks for the apparel sector to guide sourcing decisions, strengthen accountability, and accelerate the adoption of lower-carbon practices. The first iteration will be available for public review and comment in summer 2025.

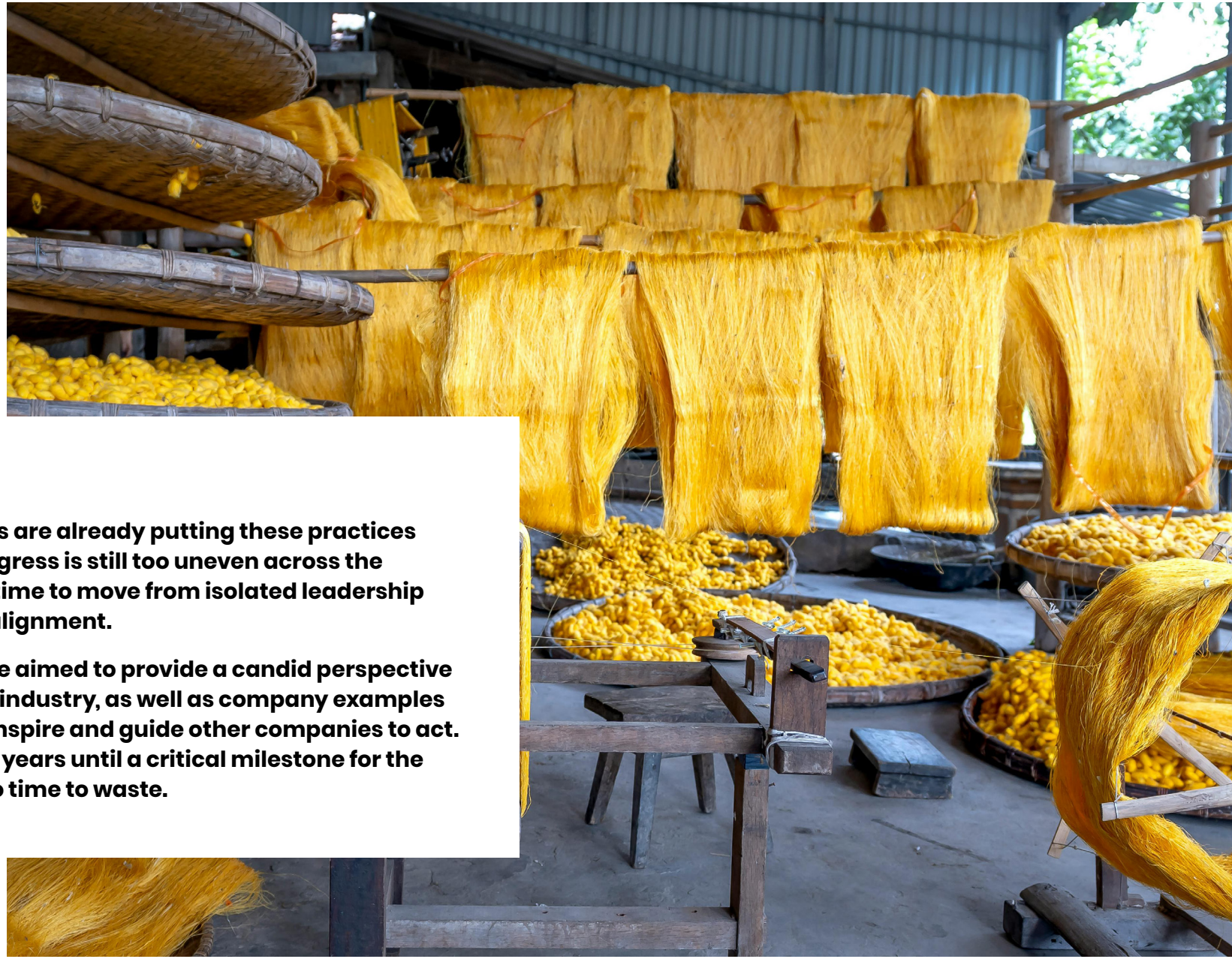
Our Call to Action

Manufacturers

- **Adopt proven, cost-saving solutions.** Many manufacturers are already cutting emissions and operating costs through practical upgrades like energy efficiency retrofits, waste heat recovery, and solar installations. For those facing tighter financial constraints, especially smaller facilities, programs like Aii's Clean by Design offer a more accessible starting point. By focusing on low-cost, high-impact process improvements, the program delivers quick wins that often yield a return on investment within a short time.
- **Engage in structured climate programs.** Join initiatives like the Manufacturer Climate Action Program (MCAP) or Renewable Energy Transition Initiative (RETI) to set science-aligned targets, access technical support, and build financial credibility.
- **Demonstrate and share your progress.** Publicly tracking emissions reductions, sharing operational learnings, and highlighting returns on investment not only strengthens your position with brand partners but also builds trust, unlocks shared progress, and ensures the industry learns together instead of reinventing in silos.

Financial Institutions/Philanthropy:

- **Support catalytic models.** The Fashion Climate Fund is already demonstrating how blended capital can unlock commercial investment by absorbing early risk. By contributing to the Fund, financial and philanthropic partners can play a direct role in closing the financing gap—helping to subsidize technical assistance, enable facility-level decarbonization roadmaps, and scale the most effective solutions identified through the Climate Solutions Portfolio.
- **Develop accessible instruments.** From loan guarantees to catalytic capital, we need financial products that reflect supplier realities.
- **Reward emissions reduction.** Financing products can play a critical role in supporting decarbonization by linking terms to emissions outcomes. Directing capital toward suppliers delivering verified climate impact reinforces accountability and helps scale the solutions that are already working.



Conclusion

Many stakeholders are already putting these practices into place, but progress is still too uneven across the sector. Now is the time to move from isolated leadership to industry-wide alignment.

With this report, we aimed to provide a candid perspective on progress in the industry, as well as company examples and resources to inspire and guide other companies to act. With less than five years until a critical milestone for the planet, we have no time to waste.