



PANGAIA

IMPACT & SCIENCE
REPORT 2022

Welcome to our 2022 Impact & Science Report

PANGAIA is a materials science company that brings problem-solving innovations to the world by looking to nature for solutions that are more in harmony with our planet. Our goal is to use technology to responsibly scale these innovations so that they become the new normal.

PANGAIA is a global collective of one heart and many hands, joining forces to accomplish together what we could not achieve alone. We create with one big goal: to establish a way of life on our planet in balance with nature for all future generations.

We call this ‘Earth positive’.

2022 at a glance

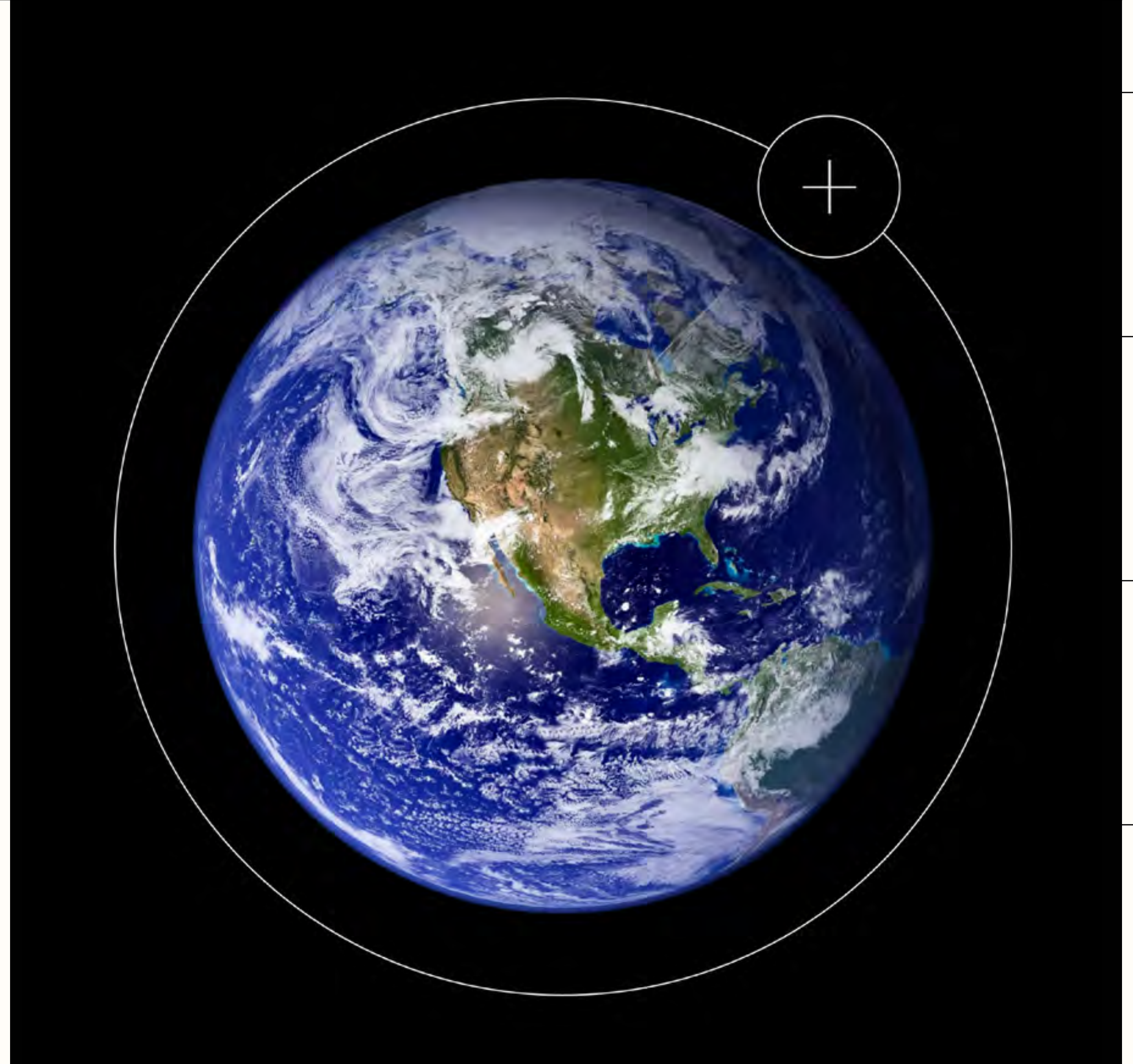
2022 was a big year for PANGAIA. We have had many successes this year, and, like many, we have also faced challenges. We navigated demanding macroeconomic environments, overcame inevitable innovation setbacks, and pushed the boundaries with disruptive products such as our bio-based activewear, Spiber™, food dyes capsule and the launch of PANGAIA LAB, while also achieving B Corp certification. We are here to share our highlights and key learnings throughout this report.

A driving force for our work is a sense of urgency, driven by the understanding that our planet is in a state of environmental crisis and that we all collectively have the responsibility and the tools needed to drive meaningful positive change. The effects of climate change and the impact on people and ecosystems continues to fuel our vision to build an Earth-positive business.

We also strongly believe in the power of community to problem-solve. We recognize that we cannot effect change alone and that we have a lot to learn from each other; working together to innovate and create within planetary boundaries. As we reflect on the year behind us, we are proud of how far we have come but we know we have a long way still to go. We look forward to sharing the journey with you, happy reading!

Signed,

The PANGAIA Collective



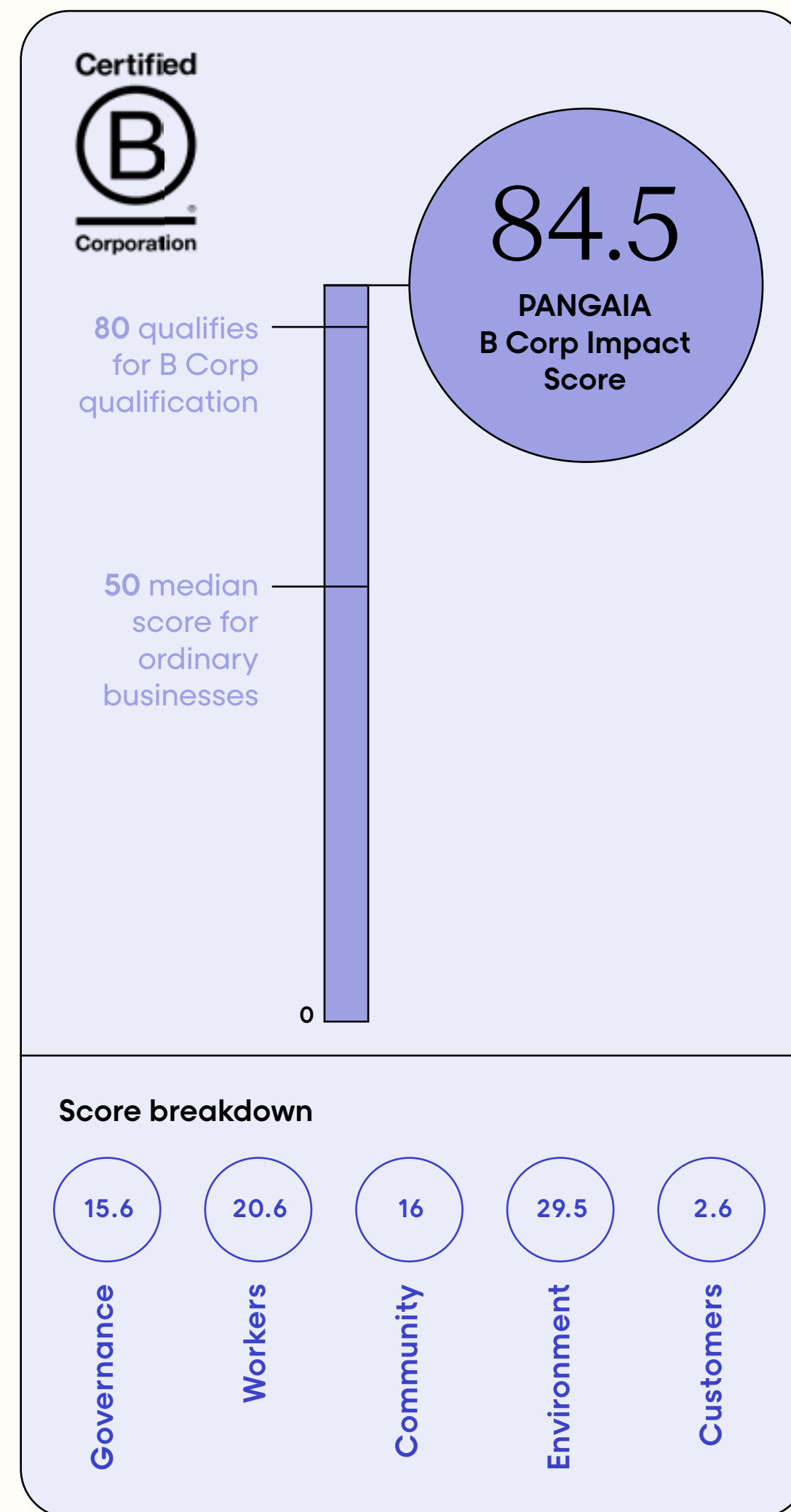
Better business to serve our people, community and stakeholders

As a young company, achieving B Corp certification in 2022 was a significant milestone for us. We're proud to be a part of the inspiring community of B Corp-certified brands and businesses who live the highest social and environmental standards for people and planet.

B Corp

To become a B Corp, a B Impact Assessment must be completed, where a business is rigorously assessed on its practices, values and outputs across 5 categories: governance, workers, community, the environment and customers. To certify, it must score over 80 points which means it is meeting high standards of verified performance, accountability and transparency. Our score is based on our first fiscal year (2020) as a company, so we are delighted with achieving 84.5 points.

B Corps recertify every three years, so our next assessment will take place in 2025. As the B Corp certification process continues to evolve, we intend to progress through it, being held accountable for our actions and sharing our progress annually through our Impact & Science Report. Our ambition is to champion the B Corp mission and push for a future score of 100, bringing us closer to being the Earth-positive business we aspire to be. For more information, view our [B Corp profile](#).



Our 7 impact pillars underpin the work that we do

Keeping these principles in mind ensures that we're aligned as a business toward our Earth-positive ambition. We define 'Earth positive' as both a goal and a philosophy, with the aim of building a business that creates value while elevating human, animal and plant quality of life, bringing us in harmony with nature and giving back more than we take.



What to expect in this report: the highlights, challenges and our future ambitions

As we move onto our third Impact & Science Report, we begin by placing more of a focus on our material science and innovation work, which is foundational to our existence.

We were conceived as a materials science company with the ambition of scaling game-changing innovations that can support the industry's transition to a more sustainable future. We will explain what responsible innovation means to us and how we go about commercializing the highest potential innovation, sharing case studies and 2022 highlights along the way.

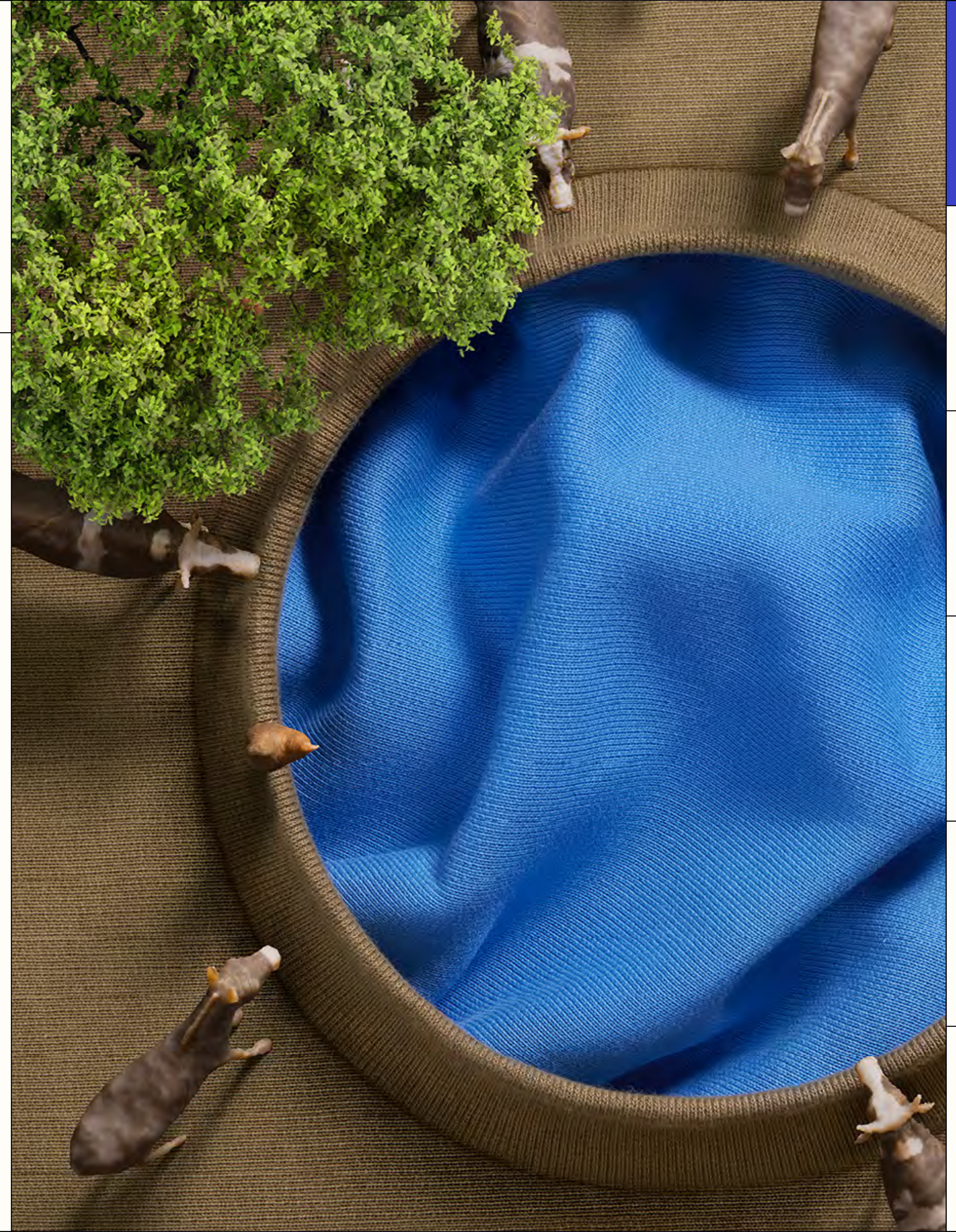
It's essential to note that the governance mechanisms and strategy behind our Research and Development (R&D) work are just as important as the innovation itself. It ensures that we're engaging responsibly and that we're keeping up with best in class frameworks, measurement and thinking in the space. We will shine a spotlight on a selection of the year's R&D successes, our LCA work and how our material usage compares with our Preferred Materials List (more on that later).

Our 'Planet' strategy is composed of our work on Climate, Water & Biodiversity. These interrelated but uniquely important facets all present their own challenges and opportunities for a brand that creates products. We will share more on our decarbonization strategy and progress, plus outline our plans for tackling water health and biodiversity in our supply chain.

The intersectionality of people and the planet is integral to how we respond to the current and future challenges we face. From climate change and the cost of living crisis, to war and poverty, we know that the world is not fair, equitable or just. That is why we place huge emphasis on our social and ethics work within our value chain and as an employer. Our 'People' strategy sets out our on-going, ethical social engagement, with the ultimate aim of positively impacting the lives of all those involved in making PANGAIA.

Finally, we acknowledge that effective and collaborative partnerships across the fashion industry and beyond are the only way we'll be able to reach our Earth-positive ambition and so, the 2022 report concludes with an overview of the network of partners we are building and how our business-to-business (B2B) function accelerates the dissemination of game-changing innovation across the industry.

Before we jump in we wanted to highlight a step change for this report, in concluding every chapter with our commitments to the year ahead. A simple step forward but a transparent disclosure to our community about where we want to go and how we are going to get there.



INTRODUCTION

INNOVATION

MATERIALS & SYSTEMS

PLANET

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INNOVATION

Responsible innovation is the foundation of our existence as PANGAIA

Materials and materials science are at the core of everything we do within the research & development (R&D) team at PANGAIA.

Our approach is a commitment to review everything, from raw materials that make up the bulk of our components (polymers, both natural and synthetic) to additives, auxiliaries, dyes and chemistry that are used in the processing of these materials.

We then work internally, through joint ventures or with external partners, to innovate our way out of using anything we have identified as harmful or irresponsible.

The ultimate goal is to create materials, processes and systems that are beneficial to the planet and people - such as regenerative systems and carbon-capturing technologies.

What does the R&D innovation process look like at PANGAIA?

Innovation is the intended outcome of research & development. It happens when you propagate a new or novel idea. It's the end goal and the democratization in making these ideas accessible to the rest of the industry is vital. This is how we envision material innovation at PANGAIA—more of an applied science than a fundamental one.

However, the path to implementation is fraught with hurdles. One of the main pitfalls of emerging technologies is known industry-wide as the 'Innovation Valley of Death'.

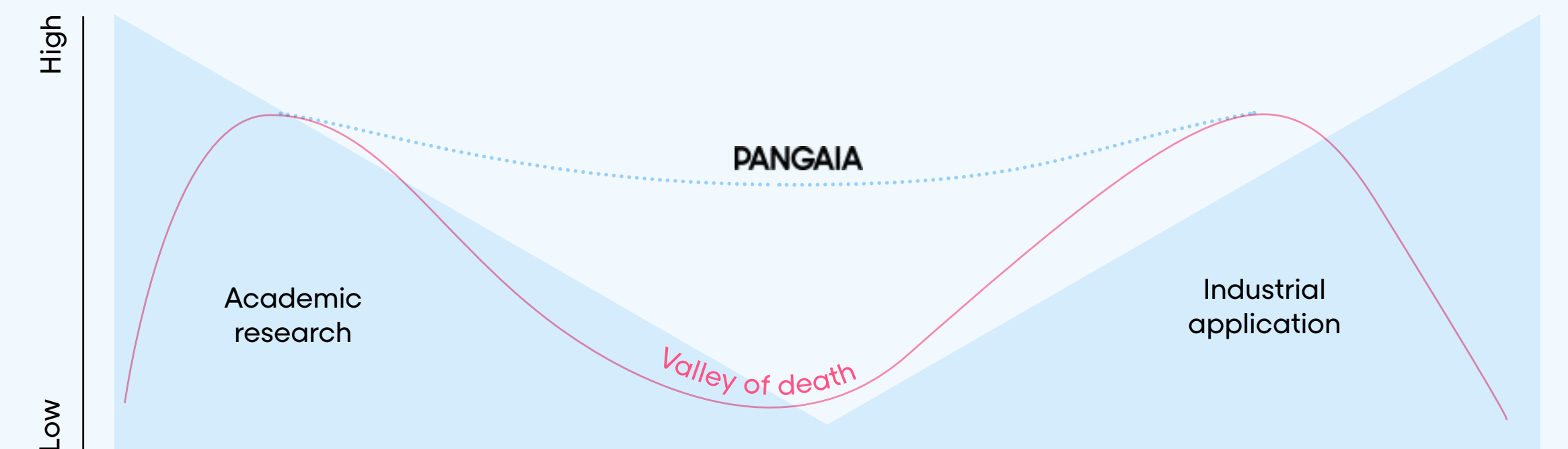
The Valley of Death is an established term in the start-up world and refers to the gap between early-stage research and development and scaled, commercialized adoption. This transition requires a disproportionately large influx of resources in order to successfully cross and this is where many companies and technologies stumble.



Bridging the Gap: The Innovation Valley of Death

Public funding/
private investment

Financing available



EXPLORE			VALIDATE			INTEGRATE		
1 Identify	2 Define	3 Demonstrate	4 Prototype	5 Validate	6 Prove	7 Apply	8 Confirm	9 Deploy

We believe in the power of innovation to disrupt the fashion industry

At PANGAIA, we see ourselves as a bridge and go-to-market partner that helps emerging technologies and startups traverse this valley.

The approach utilizes a few principles:

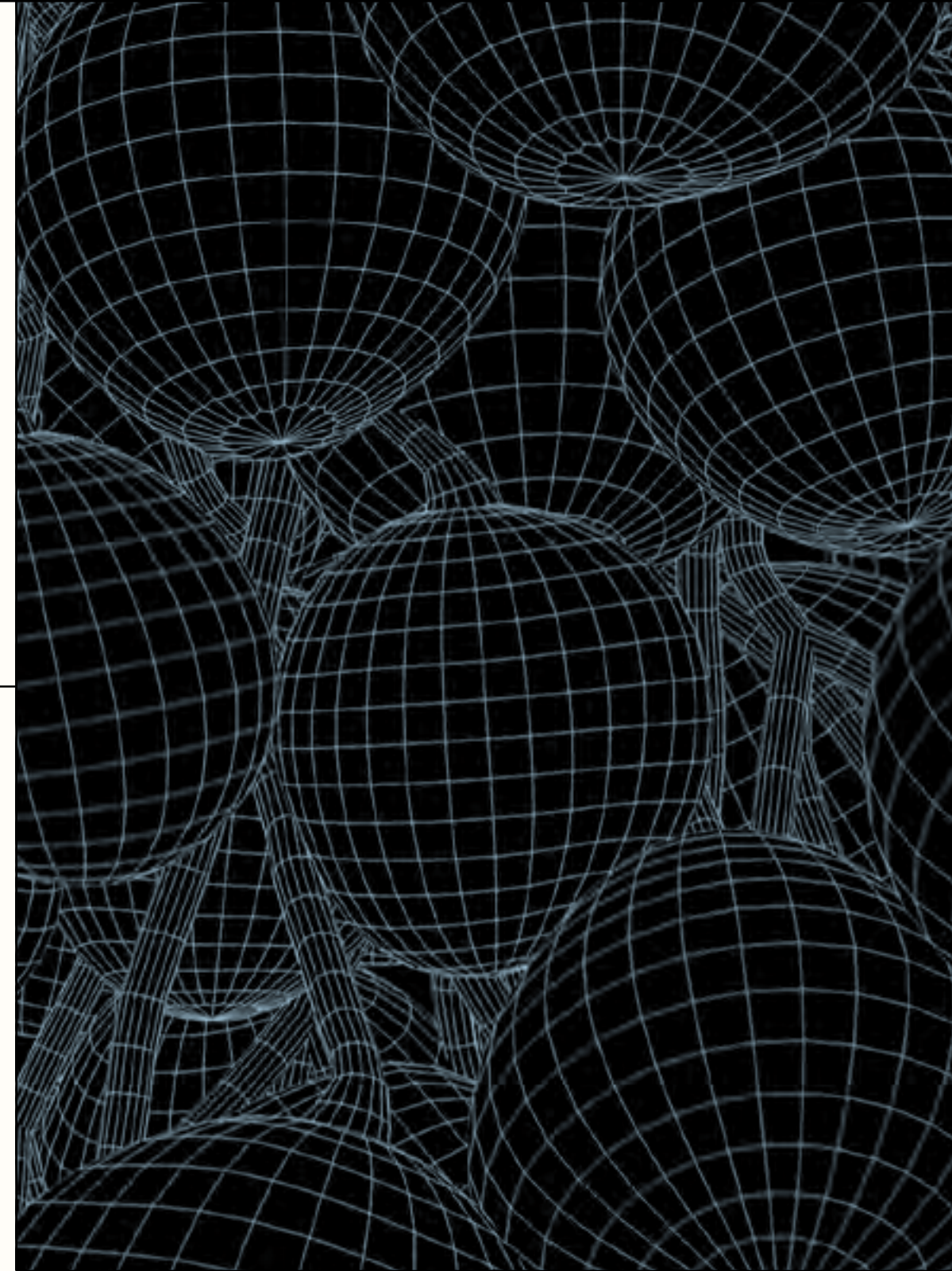
- **Shepherding.** Our team provides both industry know-how and an extensive network of complementary supply chain partners to help startups progress through their 'readiness levels' (more on this later) and move in the right direction. In some instances, we can connect or suggest companies for accelerator programs like Fashion For Good, or we often mentor them ourselves. Mentorship can revolve around topics like technical specifications and requirements, relevant test methodology, general problem-solving or even flagging certain impact criteria of concern (e.g. environmental and social).
- **PANGAIA LAB.** LAB products are the first, best or only execution of a material or technology in the market for a particular product type. It allows startups to have an earlier market entry point whilst serving as a de-risking exercise and an exposure opportunity for startups. The end goal is to build upon this first-to-market launch and provide a platform for the innovator to garner more interest from the rest of the industry or even raise their valuation for further fundraising.

- **Investment.** The main obstacles associated with the Valley of Death are related to monetary funds and capital expenses. In some scenarios, PANGAIA may even invest in a startup partner as a strategic investor. In addition to financial contributions, our involvement via expertise, human resources, design, development and guidance can be just as valuable.

In the background of all of these innovator partnerships (or even for academic or in-house developments) is the critical relationship between PANGAIA's R&D and Impact teams.

Impact is central to what we do at PANGAIA. It underpins all of our R&D and subsequent product developments. This can practically be viewed with Impact setting the 'why', R&D answering with the 'how', and Product being the 'what'.

Our approach considers the impact of how and where we innovate. Combining an Earth-positive focus with innovation delivers responsible innovation, which remains our ongoing mission.



An approach that considers the impact on where and how we innovate

$$\begin{aligned}
 & \text{“sustainability”} \\
 & + \text{innovation} \\
 & = \\
 & \text{responsible innovation}
 \end{aligned}$$



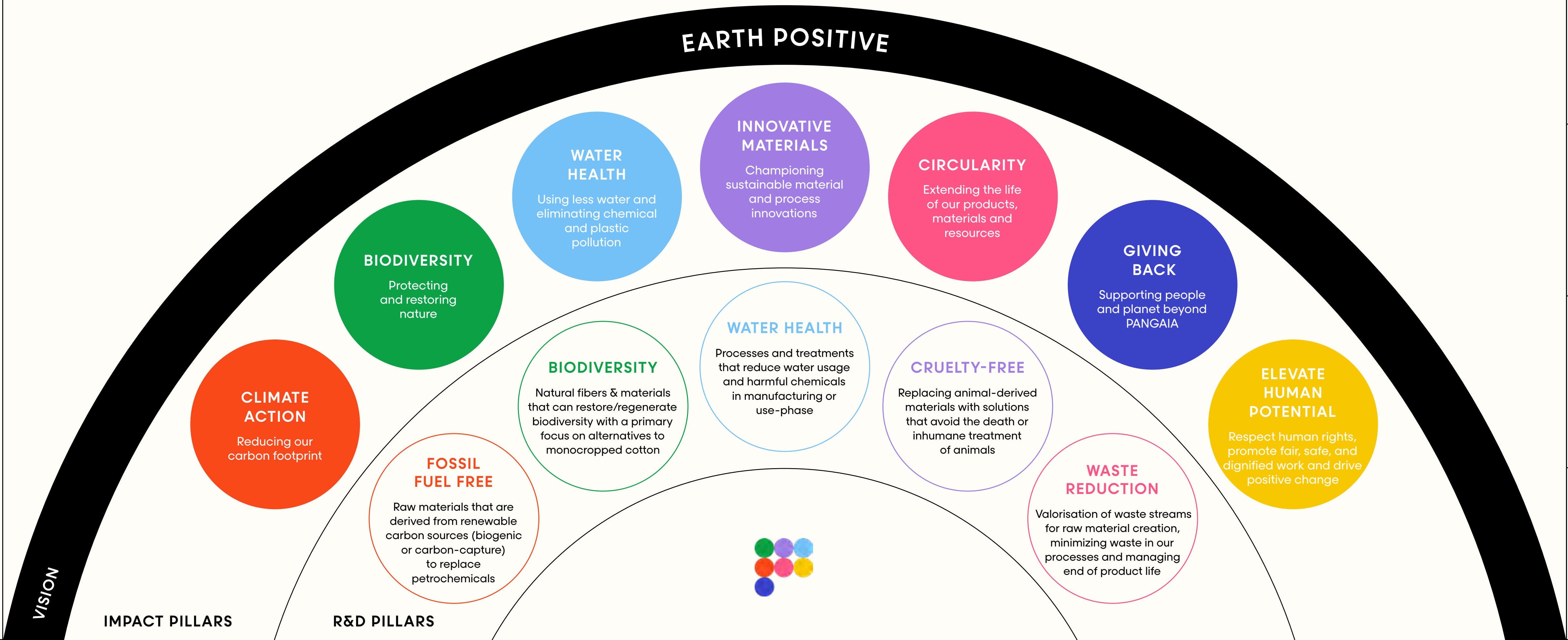
The interdependency between impact and R&D at PANGAIA

The impact pillars and research pillars

The research pillars for R&D are categorized to fall in line with the company's overall impact pillars. All projects, developments, technologies or materials will have a primary pillar (or industry problem) that they address.

Underpinning all of our R&D work is an approach that promotes:

- i) testing internally and with our development partners.
- ii) transparency into the supply chain.
- iii) education to the wider industry.





The path from idea to commercialization

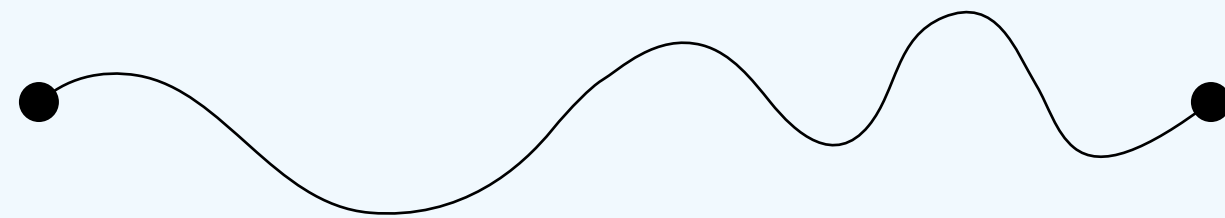
The innovation readiness level

We have adapted the traditional concept of technology and innovation readiness levels and integrated elements that are more relevant to our business and teams.

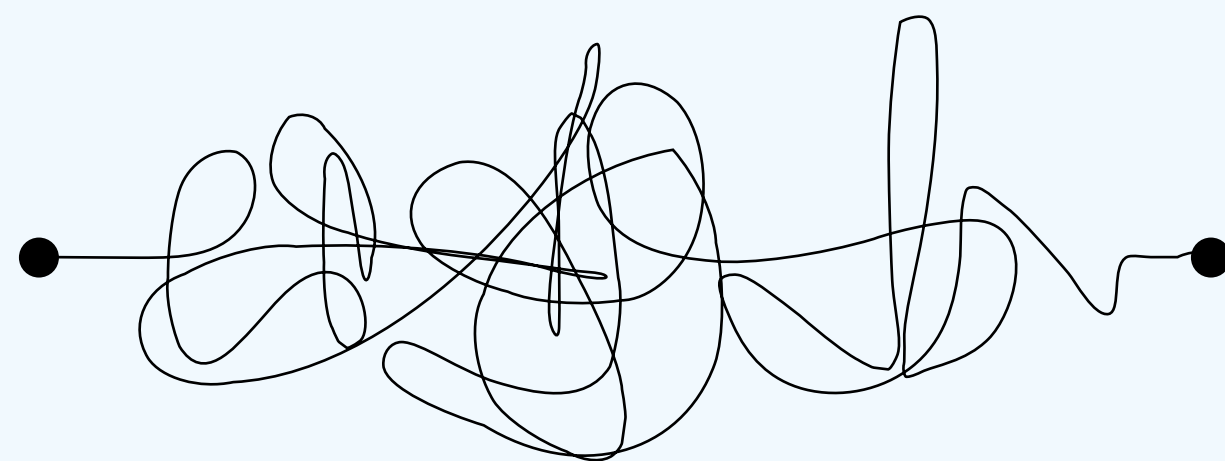
This allows us to apply a methodology to both of our in-house and collaboration-based working models. We have built in numerous touch points that allow R&D and impact to also identify environmental and social benefits.

The innovation process

EXPECTATION



REALITY



EXPLORE	1	Identify	<ul style="list-style-type: none"> Policy alignment. Identifying industry or brand relevance and major footprint contributors that could be solved. Evaluating a technology's maturity and where/how it could slot in to the business (PANGAIA LAB/mainline/B2B). 	INTRODUCTION
	2	Define	<ul style="list-style-type: none"> Defining what the problem, solution, application is for a given idea, technology or material in the context of its wider landscape. Consider alternative solutions or approaches. 	INNOVATION
	3	Demonstrate	<ul style="list-style-type: none"> We ask suppliers to fill out an Impact Concept Vetting Form (ICVF). This gives an overview of the technology or material being proposed, where it is being manufactured, which supply chains it is reliant on and how it provides a solution to a recognized challenge. It also allows us to assess the risk associated with the material/process/feedstock as we step into new supply chains. In 2022, this process was formally launched and resulted in 28 reviewed, 12 approved, 3 rejected (the remaining 13 have been paused or investigations continue). Fundamental proof-of-principle: does the material show enough promise in terms of environmental benefits, social responsibility, technical feasibility and material properties? 	
VALIDATE	4	Prototype	<ul style="list-style-type: none"> Form strategic innovator partnerships. Begin concept and product design phase: material to product. 	MATERIALS & SYSTEMS
	5	Validate	<ul style="list-style-type: none"> Cross-collaborative stakeholder onboarding and iterative development. 	PLANET
INTEGRATE	6	Prove	<ul style="list-style-type: none"> PANGAIA LAB launch: limited run go-to-market partnership outcome and testing with consumers. Strategic industry partnerships. Proof of concept for further development into commercial product launch. B2B onboarding - aid in commercialization. 	
	7	Apply	<ul style="list-style-type: none"> Delivering procurement guidance to the product teams and identifying risks and areas of concern to mitigate through the research requests process, resulting in 32 approved, 6 rejected and 20 paused in 2022. Commercialization and scaling begin: start establishing supply chain (Tier 2+). Commercial product development initiation. 	
	8	Confirm	<ul style="list-style-type: none"> Integration into mainline. Iterative development, testing, improving, and signing off on product or technology claims. 	PARTNERSHIPS
9	Deploy	<ul style="list-style-type: none"> Undertake material assessment. Full commercial production through PANGAIA DTC and/or B2B businesses. 		

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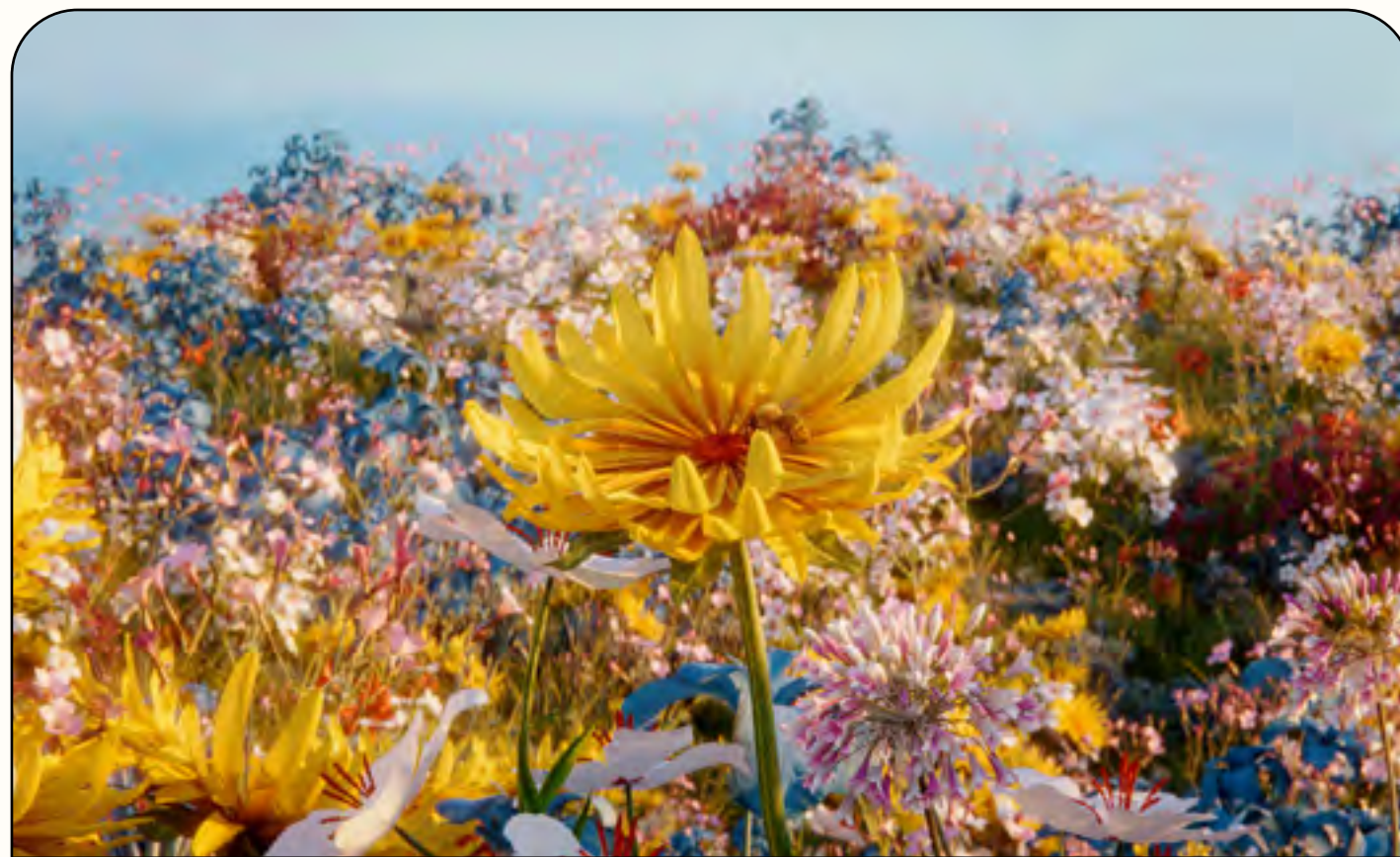
PARTNERSHIPS



FLWRDWN™

—a case study

FLWRDWN™ is our patented, high performing and animal-free replacement for traditional animal and petroleum-based synthetic down.



EXPLORE	1	Identify	<ul style="list-style-type: none"> Traditional insulation materials are either petrochemical/plastic, the by-product of the death or other inhumane practices towards an animal (i.e. live-plucking). 	INTRODUCTION
	2	Define	<ul style="list-style-type: none"> Explore the possible natural and bio-derived materials, or combination of materials, that can mimic the properties of down and synthetic loose-fill insulation (wildflowers, PLA, cellulose aerogel, other plant fibers and biosynthetics, etc.). 	INNOVATION
	3	Demonstrate	<ul style="list-style-type: none"> Test and evaluate material properties (morphology, fill power, thermal resistivity). 	
VALIDATE	4	Prototype	<ul style="list-style-type: none"> Prepare for concept development (e.g. test pillows). 	MATERIALS & SYSTEMS
	5	Validate	<ul style="list-style-type: none"> Establish small-scale production partnerships and develop garments. 	PLANET
	6	Prove	<ul style="list-style-type: none"> Work around manufacturing obstacles and define an acceptable level of performance and limitations (e.g. machine laundering vs. spot-cleaning care instructions); product compliance/quality-assurance. 	
INTEGRATE	7	Apply	<ul style="list-style-type: none"> Invent and innovate around challenges highlighted from product launch (machinery, automation, process, recipes), leading to improved fill power. 	PEOPLE
	8	Confirm	<ul style="list-style-type: none"> Work with key scaling partners and industry clientele to make sure the technology is answering a need and provides value (B2B portfolio integration, economies of scale, bespoke equipment). 	PARTNERSHIPS
	9	Deploy	<ul style="list-style-type: none"> Launch commercially with competitive pricing, scale and usability (now and in the future). Commission LCA to understand comparative impact against conventional alternatives, as a form of impact validation. 	

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Impact x innovation material highlights 2022

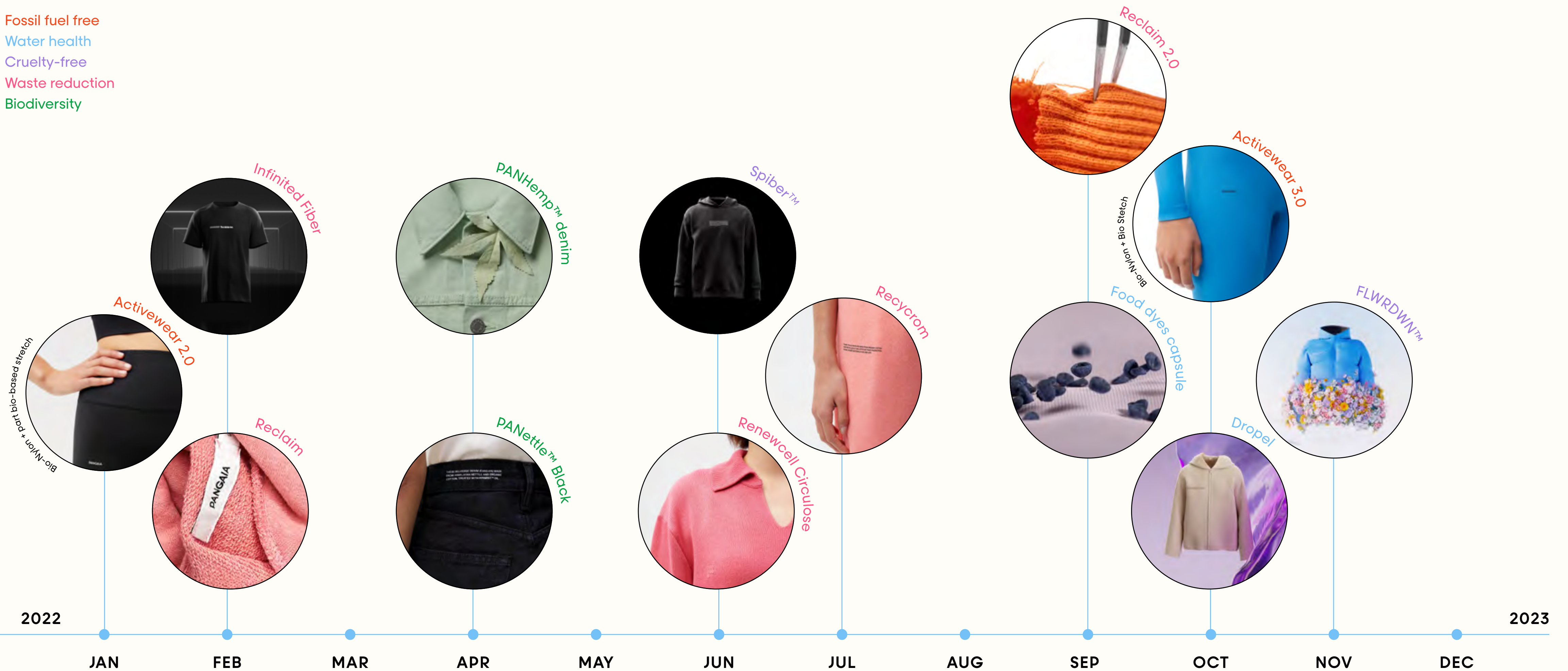
In 2022, we demonstrated our commitment to commercializing innovation through a number of product launches.

We were first to market with innovative recycled materials, introduced activewear with ~95% bio-based content (a product sector that is traditionally reliant almost entirely on fossil fuel-derived materials), and commercialized innovative dyeing and finishing technologies that reduce the usage of water and toxic chemicals.

Our proprietary technology FLWRDWN™ continued to improve with increased fill power and elevated technical properties. For more information on each of the launches, please see the [Appendix](#).

R&D PILLARS

- Fossil fuel free
- Water health
- Cruelty-free
- Waste reduction
- Biodiversity



Takeaways

- ☑ In 2022 we moved innovation from a siloed R&D function to one that is prevalent across the business. We **integrated more teams** into our adapted **innovation readiness level** process and will continue to have this as the basis of our material integration into the product workstreams.
- ☑ **PANGAIA LAB** launched with two key innovations:
 - **Infinited Fiber Company: The Infinite Tee.** The world's first T-shirt made from 100% post-consumer cotton-rich textile waste, recycled with a responsible chemistry compared to standard viscose.
 - **Spiber™: The NXT GEN Hoodie.** The first hoodie using Brewed Protein™ that can replace animal protein fibers, such as wool or silk, for a cruelty-free fine fabric.
- ☑ In 2022, we introduced **9 new materials** and **3 finishes**, through joint ventures, industrial partnerships and some proprietary patents. Amongst these innovations are new and improved versions of existing technologies, demonstrating the importance of iteration in the innovation process.
- ☑ Developed **fiber strategies** for materials beyond cotton to increase champion and runner-up materials across all new products.

Actions for 2023

- ☐ In 2023 we commit to a target of **4 PANGAIA LAB** launches.
- ☐ In 2023 we commit to **commercializing at least 1 prior PANGAIA LAB launch** or a similar emerging innovation into our mainline product offering.
- ☐ Introduce at least **1 new PANGAIA technology** by the end of the year.



THESE TRACK PANTS ARE MADE WITH COTTON GROWN USING REGENERATIVE FARMING PRACTICES THAT AIM TO RESTORE NATURE, REHABILITATE SOIL HEALTH AND SUPPORT FARMER LIVELIHOODS.



MATERIALS & SYSTEMS

PANGAIA Materials: 2022 in review

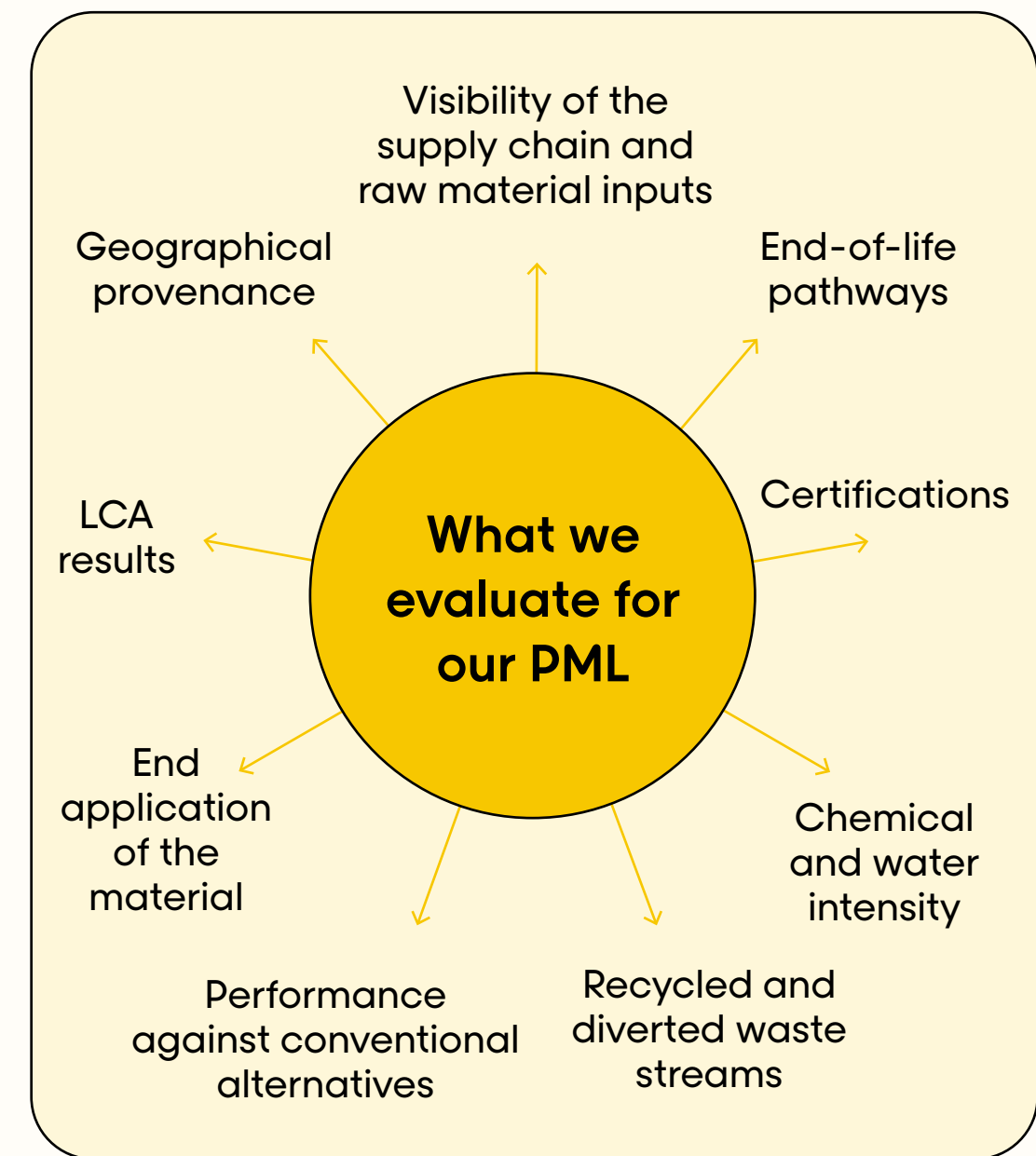
In 2022, we continued to bring impactful innovations to market, launched our ambitious cotton strategy and maintained our commitment to objective impact assessments through our Life Cycle Assessment (LCA) program. We've also continued to build our governance process throughout our value chain and R&D pathways, ensuring that innovation never comes at the cost of impact.

Where are we now?

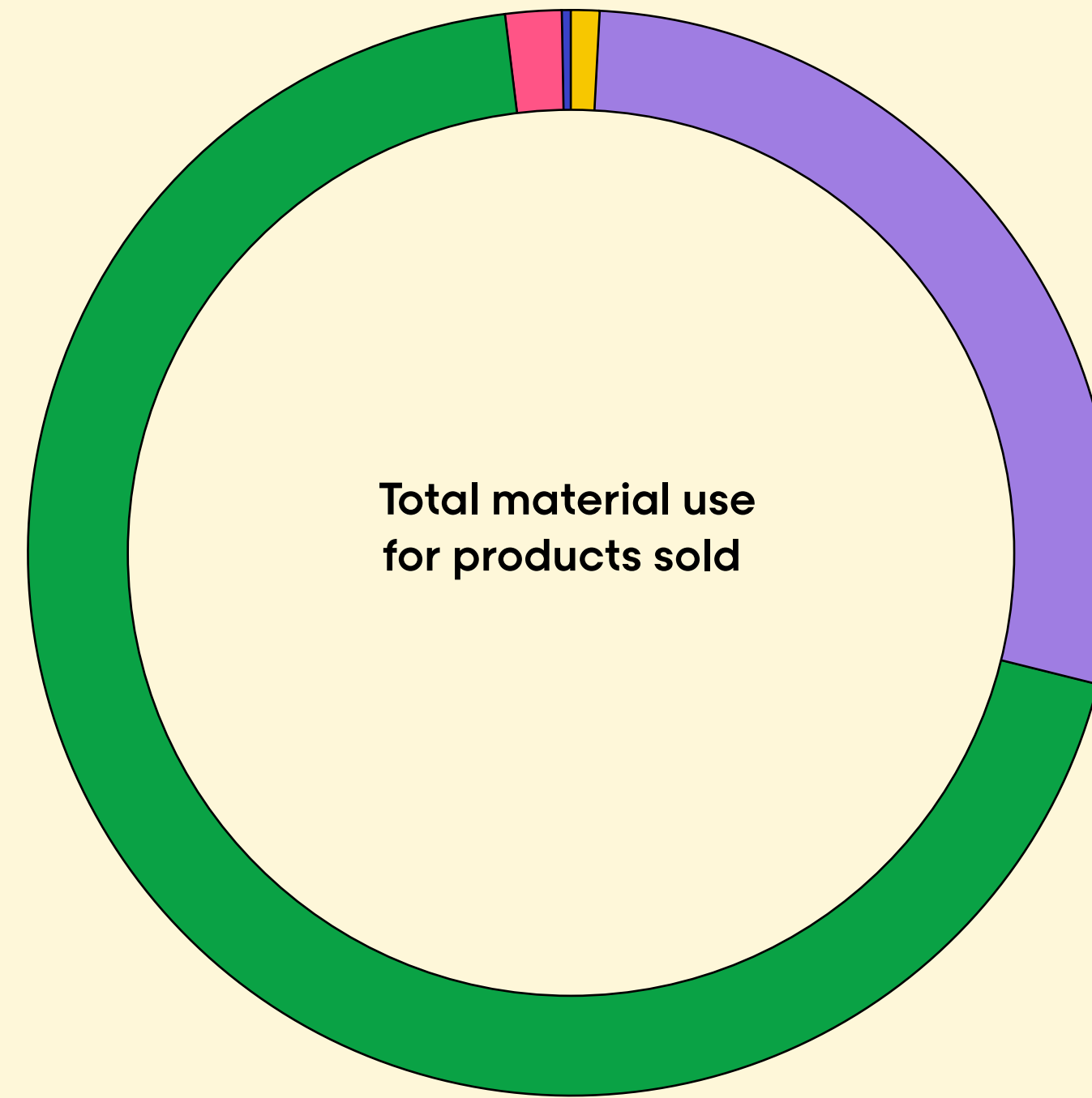
Last year, we introduced our Preferred Materials List (PML) for textiles. This list outlines the materials we work with and how they rank against our impact evaluations, including LCA insights and additional impact metrics. Our PML assesses materials within standard textile classifications, across 5 rankings from 'best in class' to 'not recommended for use at PANGAIA'. These categories are Champions, Runner Ups, Middle of the Pack, Laggards and Drop Outs.

The PML is a vital tool leveraged by our product team to inform decision-making and guide better material uptake for PANGAIA products. When scoring, we consider as broad a scope as we possibly can and plot them against our PML. Our aim is to use materials that have a reduced impact and increased benefits for climate, nature and people. As we strive toward using more sustainable materials, our PML must evolve to be reflective of this.

This year we updated the PML to include more materials and re-evaluated the rating of some materials. The PML provides guardrails for us to source as progressively as possible. In 2021 ~59% of global fiber production came from polyester and polyamide alone (within this figure 85% of all polyester and 98% of polyamide are fossil fuel derived).* Within the PML we do not endorse the use of fossil fuel derived materials and advocate for the use of recycled and biobased qualities instead. In 2022, 1% of our products featured Champion materials. Last year, we set the goal of using 15% champion materials as a landmark target. We know we have far to go, but below, we have outlined our intentions to achieve more champion grade materials, as per our PML!



Our material use in 2022



- 1% Champions
- 28% Runner ups
- 69% Middle of the pack
- 2% Laggards
- 0% Dropouts

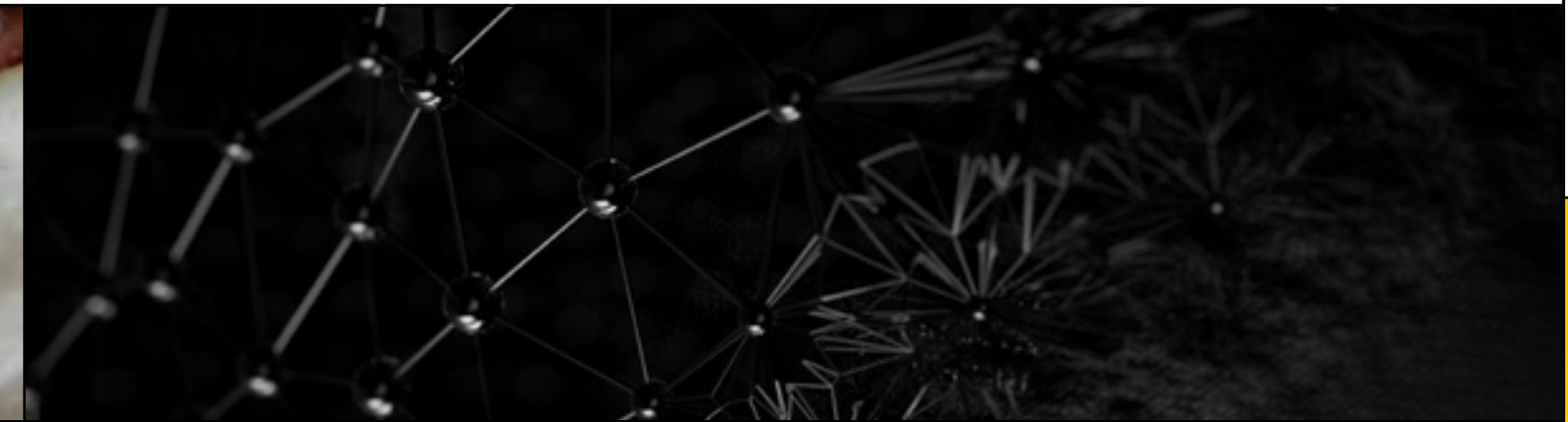
This overview is inclusive of our main materials (and some internal materials), sold through PANGAIA's D2C model. We are prioritising refining our material reporting approach to accurately account for linings, trims and other componentry and will share more insights in the future.

We have aggregated our results for accessibility; however, a full breakdown can be found below.

1% Champions	● 0.95% Biosynthetic
28% Runner ups	<ul style="list-style-type: none"> ● 26% Natural Cellulosic ● 1.44% Natural Protein ● 0.08% Biosynthetic ● 0.04% Man-Made Cellulose Fiber ● 0.03% Brewed Protein
69% Middle of the pack	<ul style="list-style-type: none"> ● 68% Natural Cellulosic ● 0.8% Man-Made Synthetic ● 0.31% Natural Protein ● 0.25% Man-Made Cellulose Fiber ● 0.09% Biosynthetic
2% Laggards	<ul style="list-style-type: none"> ● 1.16% Man-Made Synthetic ● 0.59% Natural Protein ● 0.07% Natural Cellulosic
0% Dropouts	● 0% Man-Made Cellulose Fiber

* Textile Exchange PFMR 2022

Our material breakdown and strategy updates



● Waste reduction ● Biodiversity

94% tonnage

● Waste reduction ● Biodiversity

0.5% tonnage

Natural Cellulosic

Man-made Cellulosic Fibers (MMCF)

We launched our cotton strategy in 2022. It sets out our intention to prioritize: Regenerative, Recycled and Diversified as a pathway to safeguard the future fiber pathways of our most prominent fiber category.

Our first in-conversion to regenerative cotton launch

In 2022, we launched our In Conversion to regenerative product range. Our first investment in regenerative cotton supported 1000 smallholder farmers in the state of Maharashtra, India

(Aurangabad district) to be trained in regenerative practices, in partnership with Arvind. The training includes farm management practices, the use of natural pesticides and improving yield to positively impact farmer incomes.

The project is focused on transitioning an already organic farm to a farm that utilizes regenerative practices and uses field-level data to measure its success.

Recycled cotton

One of our core fabrics is 50% organic cotton, 50% recycled cotton. This quality is important to us as we know that recycled

content has an objectively lower impact than that of virgin fibers. As we continue to innovate we are committed to maintaining this recycled content.

This year, we launched an exciting innovation called the Reclaim Capsule, where we leveraged our own production waste as an input for our recycled content. We have also conducted an LCA on this quality.

Diversified: Looking beyond cotton

We recognize the risks of being over-reliant on one fiber, that's why diversification is an important part of our cotton strategy. As part of our natural cellulosic

portfolio, we already use linen, hemp and nettle but we are striving for displacement opportunities through alternative natural fibers that contribute to diversification while restoring global soils, maintaining and enhancing biodiversity, increasing opportunities for agricultural communities and championing innovation within the MMCF space.

As we explore less established supply chains for textiles, like nettle plants, our focus and consideration of risk also changes. We are regularly evaluating how to engage responsibly with non-traditional fiber supply chains, and use our Impact Concept Vetting Form to inform how we assess risk.

LAB launch: INFINITED FIBER

In 2022 we launched Infinited Fiber and continued to roll out FRUTFiber™ and PLNTFiber™ in our ranges.

The MMCF category is of strategic relevance to our portfolio as we see the diversified portion of our cotton strategy being delivered by this fiber category.

Looking ahead, we will continue to develop our own material qualities of PLNTFiber™ and FRUTFiber™. We intend to prioritize next-generation pathways as feedstocks for this category.



● Waste reduction ● Biodiversity

Feedstock diversification

● Cruelty-free

2% tonnage

● Fossil fuel free

1.13% tonnage

Agri-residues

Natural Protein

Man-made Synthetic Polymer, Biosynthetic

The potential for agri-residues as feedstocks

Agri-residues are a significant material opportunity, with scope for impact-driven benefits such as:

- Reduction in burning of agricultural waste
- Potential for additional income streams for farmers
- Reducing reliance on first generation outputs of agricultural crops

Agri-biomass could be used as both fibers for mechanical processing and feedstocks for other materials such as MMCFs and biosynthetics.

In light of this feedstock supply being an emerging space, we have set minimum requirements for engagements with innovators and fiber suppliers. These are*:

- Suppliers must not breach PANGAIA's Zero Tolerance Issues [detailed in Report 2021].
- We must have Country of Origin disclosure for feedstocks.
- The inputs must not knowingly disrupt food or fuel supply chains.

*This information is gathered and monitored through our Impact Concept Vetting Form.

We recognize that our minimum requirements are insufficient and that this is an unconventional supply chain that requires more tailored due diligence. We are at the beginning of our journey in this space and hope to share more next year.

Animal-derived fibers & the future of brewed proteins

PANGAIA is committed to promoting the humane and responsible treatment of animals for all animal-derived materials and products as well as any animals used for farming practices or marketing campaigns.

We do not source any material that is derived from the death of an animal. This includes by-products and co-products of animal slaughter.

In 2022:

- We maintained our offering of recycled cashmere, rolling out our highest percentage (60-65%) of recycled content yet.
- We launched 100% traceable NATIVA™ wool sourced from Nativa farms in Tasmania, Australia.
- We launched Spiber, our first brewed protein fiber, opening the pathway of next-gen possibilities for protein-derived fibers.

Is the future powered by plants?

In 2022, we maintained our commitment to biosynthetics, launching a new generation of activewear.

With our Activewear 3.0 capsule launch, we were the first to market with a bio-based elastane, with 30% bio-based content sourced from industrial corn. Elastane is an essential component for stretch, within our Activewear 3.0 launch we combined this with 100% bio-based nylon, which comprised the majority of the composition breakdown.

We acknowledge many biosynthetics have the same end-of-life concerns as traditional petrochemical/recycled plastics and the lack of refined infrastructure to support more

appropriate end-of-life pathways exacerbates this issue. There are also certain applications and needs where a bio-based version is the only adequate option today.

Our hope is that the increased utilization of biological feedstocks will disincentivize and demotivate further extraction/prospecting of fossil fuels, eventually enabling a shift towards a bio-based economy.



● Waste reduction

2% tonnage

● Waste reduction ● Water health

● Fossil fuel free ● Waste reduction

Man-made Synthetic, Synthetic Polymer, Petro Chemical

Coloration & Finishes

Packaging

Our reliance on synthetics & challenges in navigating responsibly

We recognize the challenges of fossil fuel-derived inputs, which is why this is a pillar of our research and development approach. In line with our PML, we didn't use virgin man-made synthetic or petrochemical fibers in any of our fabrics. We continue to use recycled options where no alternatives currently exist, such as recycled nylon. We know this isn't a perfect solution, so we're exploring end-of-life options that can ensure that they maintain their value in the material ecosystem.

Large amounts of recycled polyester available on the market is derived from PET bottles, which has now become a profitable input stream for rPET—which is obviously not the aim. There are reports of conspicuous origins of polyester inputs, such as virgin plastic bottles being used as the 'recycled' input.

Bottles can be recycled in their original plastic form for several cycles, whereas for polyester we are just creating another delayed waste stream that we cannot yet manage.

Polyester has the greatest market share of fibers in the world, so when forming our material approach we wanted to move away from traditional fossil fuel-based inputs. There are alternatives to recycled polyester available, so we're constantly searching for better alternatives on the market.

Looking ahead, we understand that due to polyester's market share and scale, there is a greater possibility of established rPET recycling infrastructure being widely accessible before nylon/PA. Until that point, we will continue to consider a wide range of factors when assessing what material is most suitable for use at PANGAIA.

The future of coloration & a note on chemicals

We're committed to ensuring our supply chains and materials are free from any hazardous, banned and restricted substances that may pose a risk to human health or the environment.

Our Restricted Substance List (RSL) ensures our suppliers and partners undertake responsible chemical compliance management in accordance with global regulatory standards & requirements. Last year, we updated our RSL to include a complete ban on PFAs and PFOAs.

We launched 3 collections using innovative dyeing techniques. For example, our Recycrom range was dyed with recycled textile fibers that had been turned into colored powders for pigment dye. This colored powder dyestuff is made from 98% textile waste from PANGAIA production scraps and leftovers.

Find out more about our food dyes in the [Planet](#) chapter.

Packaging progress

Our commitment to responsible packaging balances our mission to promote emerging technologies while phasing out fossil fuel-based plastics with the goal to provide the best solution for our consumers.

In 2022, we worked with the University of California Santa Barbara to run comparative LCAs between the burgeoning seaweed-based packaging industry and incumbent materials. We hope this will help innovators identify and address value chain hotspots and improve and replace the best available packaging materials available for our packaging strategy.



How do we quantify our impact?

As explained in our Innovative Systems chapter last year, Life Cycle Assessments are an important tool for us to measure our material impact. You can find the full details of what we measure as part of our LCA program in [how we use data](#).

In 2022, we maintained our commitment to LCAs and in partnership with our supply chain partners and Green Story we have undertaken an additional 5 LCAs to add to the library of 29 LCAs now completed since our 2020 launch. The LCAs we added to our material library are:

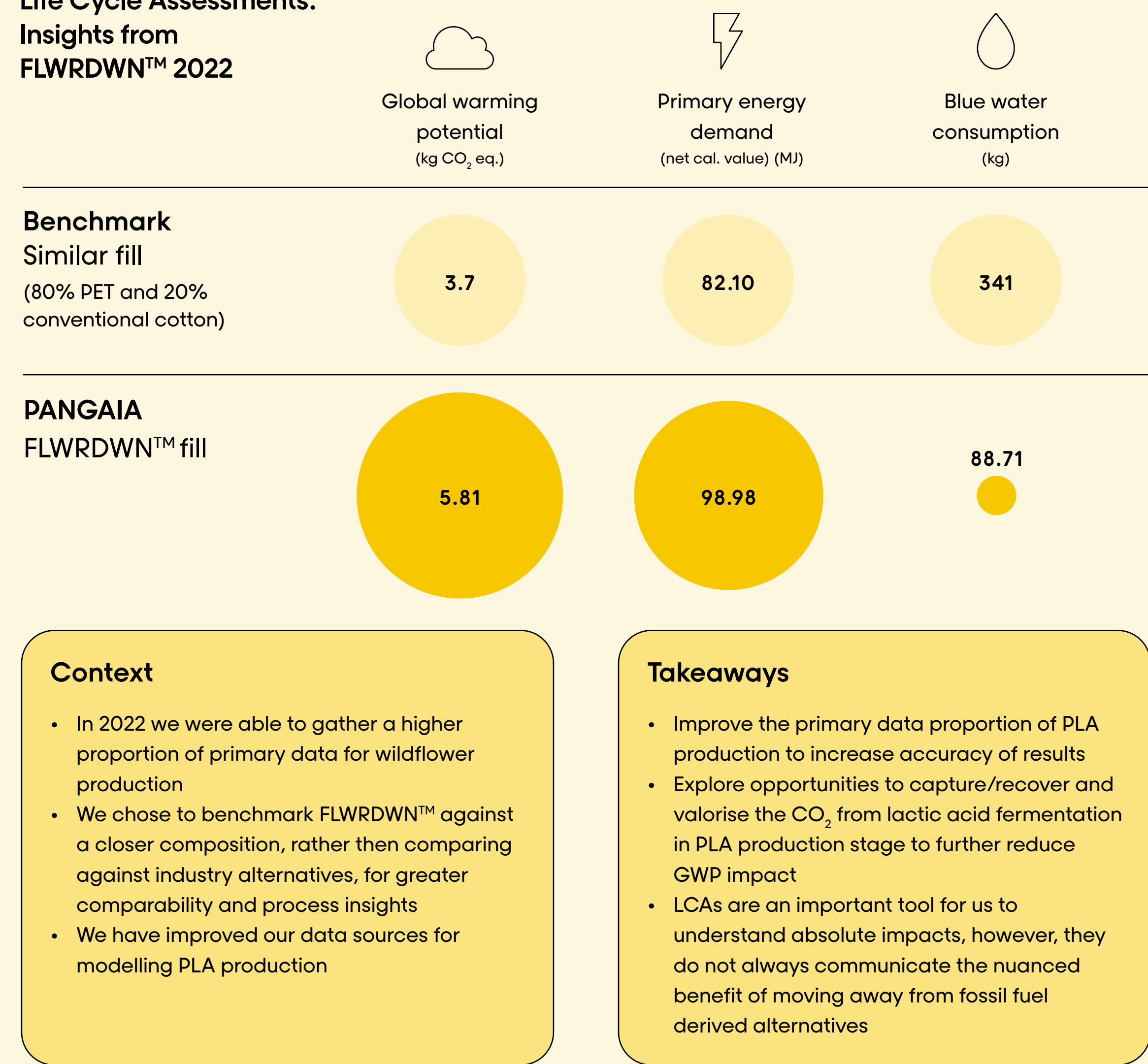
- Recycled nylon (revisited to improve primary data % collection)
- FLWRDWN™ (revisited to improve primary data % coverage), & FLWRFILL™
- Recycled cashmere
- Reclaim capsule
- Polybutylene succinate (PBS) biopolymer

Our LCA program was in pursuit of two themes:

- 1 Prioritizing Primary Data**
We know that a greater proportion of primary data gives us a more accurate picture of impacts within our supply chain. Some of our LCA data collected previously needed to be better, and this year, we focused on supplier engagement to improve data quality for our materials.
- 2 Impact Measurement for Innovation**
Objective impact measurement for innovation can be a tricky beast! We want to understand early doors, high-impact processes and areas for improvement. However, often these processes haven't reached economies of scale, and some impacts are greater than expected. We hope to share more over the coming years about the data insights gathered for early-stage innovations.



Life Cycle Assessments: Insights from FLWRDWN™ 2022





Where is our material impact?

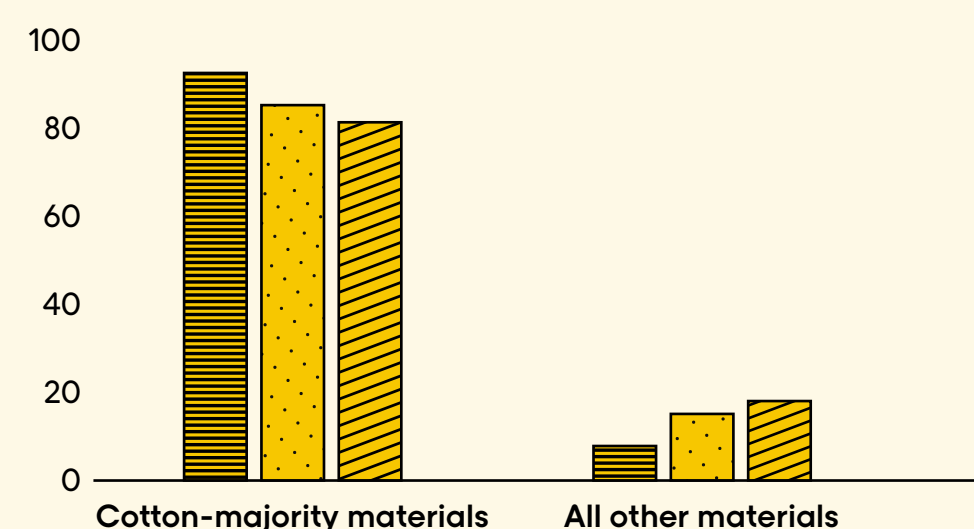
In 2022, 96% of PANGAIA apparel and accessories products sold, were covered by an LCA.

Primarily this coverage is driven by two core materials, 100% organic cotton and our 50% organic cotton, 50% recycled cotton blend. From our analysis of products sold last year, we know that 91% of our carbon impact within our material supply chain is driven by majority-cotton materials. This insight and continued reliance is fundamental to our cotton strategy approach, which outlines our intention to not only prioritize recycled inputs for cotton, but to diversify our reliance away from cotton as a fiber category.

Our LCAs give us unparalleled insights into our supply chain impacts, and provide the foundations to inform how we want to mitigate and reduce impacts within our supply chain. When evaluating our impact, we prioritize three key metrics to understand our business impacts, Carbon (global warming potential), Energy (primary energy demand) and Water (blue water consumption).

The impact of cotton

% breakdown of products sold by fiber type



From our analysis of last year, we know that:

- For all 3 of our prioritized metrics, the majority of our supply chain impacts are in Tier 3 of our supply chain. This is primarily due to the energy-intensive processes required at a fabric production level such as fabric construction, dyeing and finishing processes.
- We prioritize the use of recycled materials. This means additional processing stages are required at Tier 3 to manufacture fabrics with a high recycled content.
- For our water impact, the second highest impact stage was at Tier 5, Raw Material cultivation level. This is to be expected, due to our reliance on cotton in particular, and natural cellulosics.

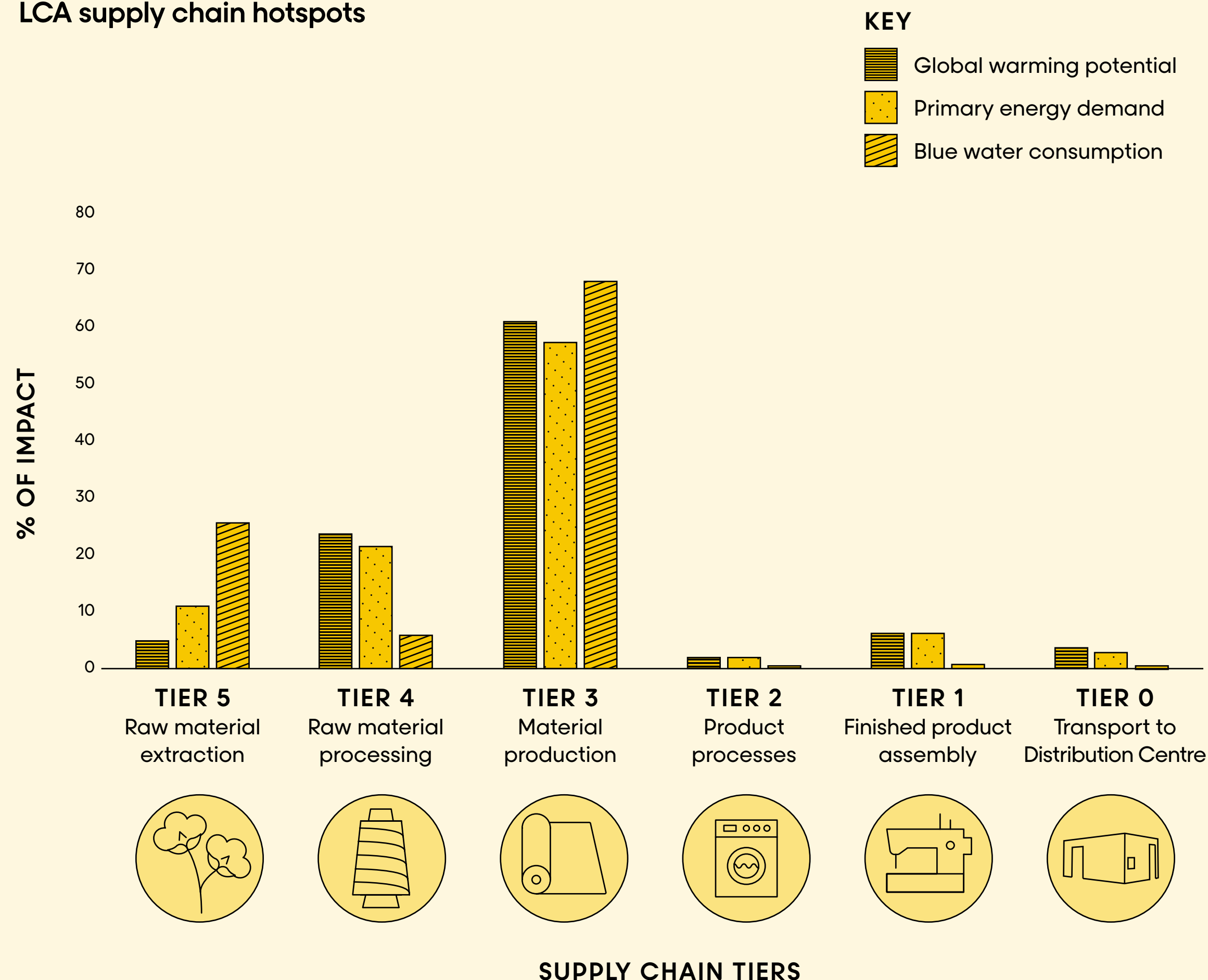
These insights will inform our strategies and supplier engagement opportunities for the year ahead.

Beyond data considerations

Undoubtedly we value the insights that LCAs provide to inform business strategy, however, we know that the landscape is changing and we intend to adapt our LCA assessments to meet forthcoming legislative and regulatory requirements. This will include:

- Integrating more metrics into our assessment (beyond the 14 we currently assess).
- Advancing our data analysis capabilities to effectively leverage additional insights from indicators beyond our prioritized metrics.
- Exploring in-use and end-of-life data opportunities to inform end-of-life pathways and cradle-to-grave LCA approaches.
- Additional third-party validation of LCAs.

LCA supply chain hotspots





What systems will we depend on in the future?

Within the value chain, we are prioritizing the transition to regenerative farming methods and practices that aim to restore nature, rehabilitate soil health, sequester carbon and train farmers on the ground to create a healthier, more biodiverse environment whilst supporting local communities.

Working closely with agricultural supply chains increases our vulnerability to unforeseen shocks, whether they be in relation to climate change, economic factors or natural disasters.

Over the course of 2022, we identified an opportunity to directly support farmers to transition to regenerative in Türkiye. In light of the devastating earthquakes that have impacted the southern regions in Türkiye, our pilot project will not be going ahead. There are several factors that have affected this decision, most notably the impact on the domestic cotton processing sector, which has been deeply impacted by the earthquakes. In turn, this has compromised the financial viability of growing cotton for the local communities, married with the risks associated with a regenerative transition, it was not feasible for farmers to proceed at this time, a decision that PANGAIA wholeheartedly understands and supports. Whilst this is a setback we see it as a continuing reminder of the fragility of economies in light of natural disasters, the profound impact they have on people, and that our regenerative engagement must be sensitive to the farmers' circumstances and local context.

Future intentions

We intend to support farmers to transition to regenerative practices by building yield loss compensation and off-take agreements into future partnerships. To scale regenerative systems, we recognize that we have a responsibility to de-risk the transition for farmers by building financial equity and security of demand as central components of future partnerships.

There are many barriers to scaling regenerative systems, and we are committed to supporting fiber sources that are working within the regenerative space in additional geographies over the coming year.

For future engagements we will prioritize the monitoring of impact against our Regenerative Outcome Measurement Framework. We support the work driven by industry bodies, such as Textile Exchange, to collectively explore and further articulate a best practices blueprint for regenerative engagement.



How do regenerative systems work?



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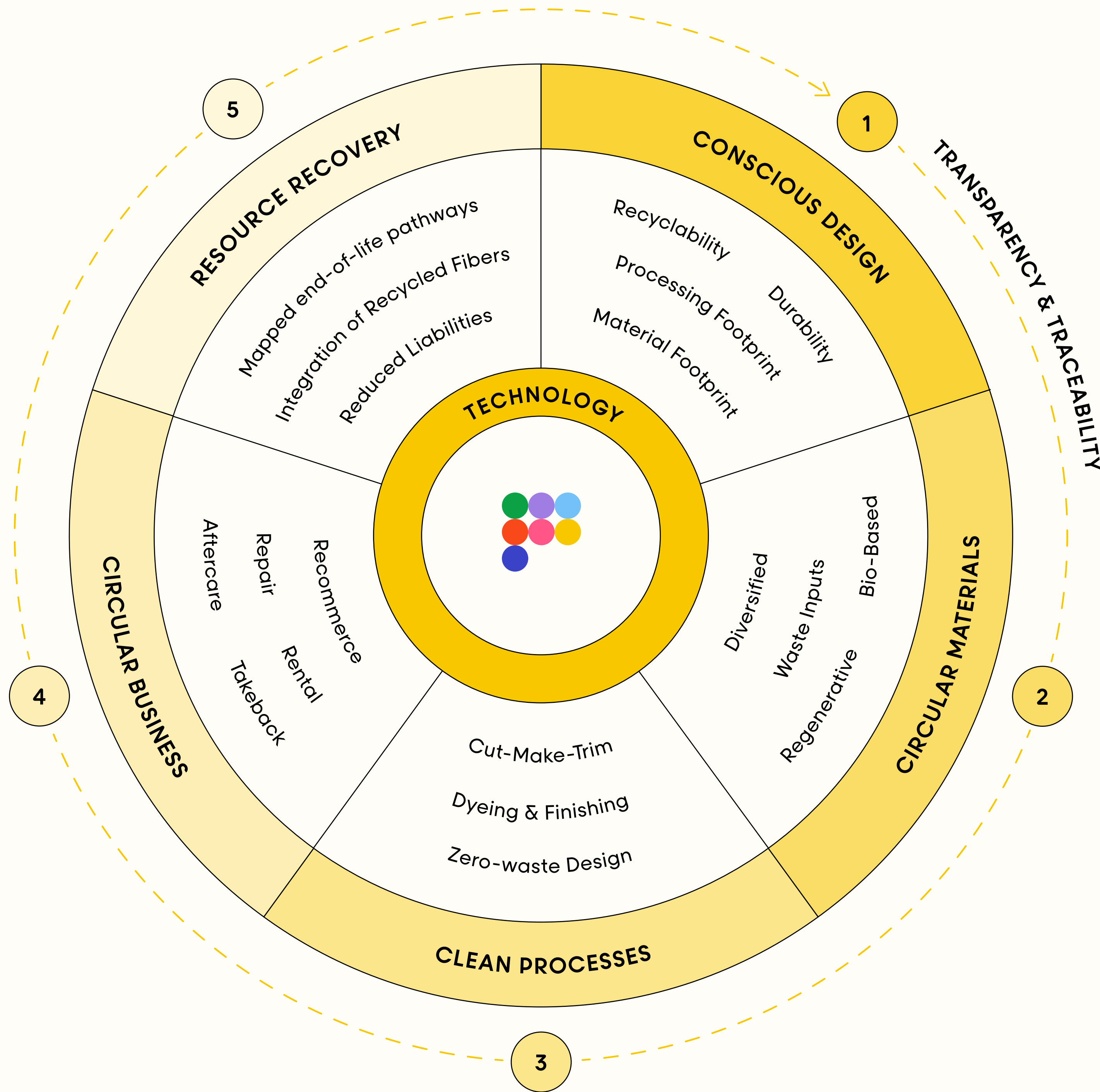
Our approach to circularity

We recognize the need to shift our business models to reduce environmental harm by decoupling growth from resource consumption and pollution.

The following principles underpin our work in circularity:

- 1 Eliminate waste and pollution
- 2 Circulate products and materials (at their highest value)
- 3 Regeneration of nature

In 2022 we began the process of applying these principles to our materials, processes and supply chain.



The interrelated elements that make up our approach to circularity

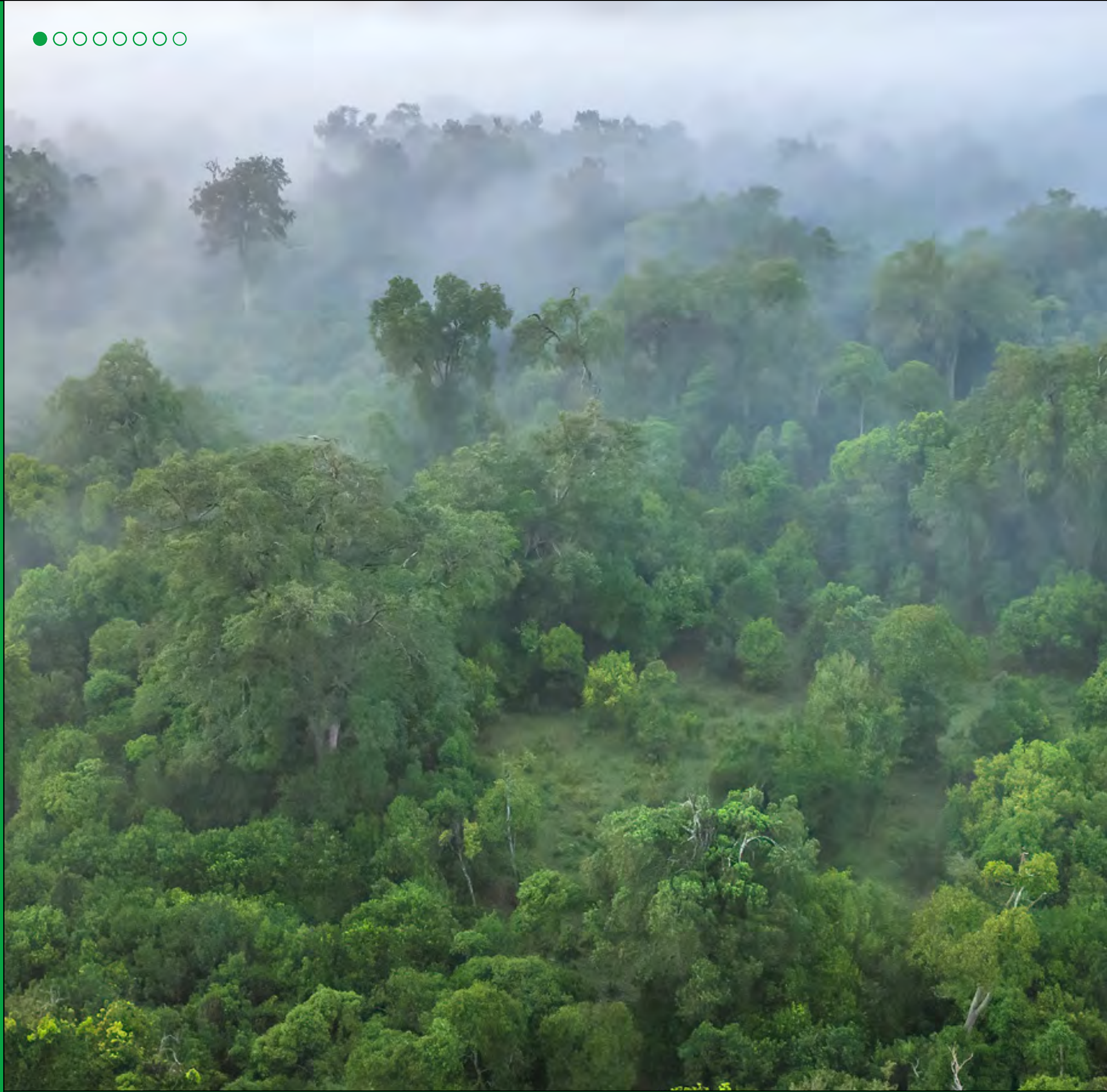
CONSCIOUS DESIGN	CIRCULAR MATERIALS	CLEAN PROCESSES	CIRCULAR BUSINESS	RESOURCE RECOVERY
<p>The design phase has a huge role to play in deciding the overall impact of a product – whether the material choice, the construction techniques or its end-of-use implications.</p> <p>We elected to use the term ‘conscious design’ to reflect the importance of intentionality in design. This includes considering how, when and for what purpose the product will be used and designing to reflect that. We use it as a more holistic term than ‘circular design’; acknowledging that the infrastructure doesn’t always exist to ensure effective recycling and therefore the need to also consider key elements, such as durability – both in the physical and the emotional sense.</p> <p>In 2022, we began the process of creating our own conscious design guidelines; a practical toolkit to be used by designers and product teams to ensure they’re considering all facets of circular design and beyond.</p>	<p>Circular materials as a pillar of our circularity approach demonstrates the interrelationship between a circular system and our broader work on material impact and R&D.</p> <p>In a circular system, we want to use materials that eliminate waste and help to regenerate nature. Our regenerative cotton commitment is a big stride forward in that regard, while also scaling up the use of recycled materials where possible.</p> <p>We have maintained the use of our mechanically recycled cotton, wool and cashmere in our product ranges. In 2022, 13% of the materials used in our sold products was recycled cotton.</p> <p>While scaling up the use of mechanically recycled cotton, we recognize that there are some limitations that only chemical recycling can overcome. For that reason, we partnered with a range of cellulosic chemical recyclers, signing a multi-year offtake agreement with Infinited Fiber Company, showcasing their Infinna® technology through a PANGAIA LAB launch and integrating Renewcell’s Circulose® into our mainline offering.</p>	<p>It is our ambition to ensure that we are manufacturing products using non-toxic and closed-loop processes, while also using technologies to design waste out further upstream. We are currently exploring the use of 3D design software solutions that reduce the sampling required, therefore reducing resource consumption in the design and product development phase.</p> <p>In 2022, we expanded our use of more circular innovative dyeing and finishing technologies – recognizing that dyeing and finishing are frequently found to be the most impactful (in terms of harsh chemistry and carbon emissions) stage of the supply chain.</p> <p>One such example is the PANGAIA Re-color Capsule. In this range, the products are made with Recycrom®, an innovative technology dye that pulverizes our textile scraps into colored powder dyes. The colored powder dyestuffs are made using 98% textile waste from our own production leftovers helping us repurpose textile waste for a more circular system.</p>	<p>Circular business models, including resale, rental, aftercare and repair, have a crucial role in increasing product utilization and extending the life cycle of our products.</p> <p>We primarily focused our efforts on other facets of our impact strategy. However, we are now beginning to explore the applicability of circular business models to our business. In 2022, we developed a strategy for resale that provides the opportunity to test, learn and iterate from different offerings.</p>	<p>We constitute resource recovery as a more efficient way to recover materials at the end of their first life and prepare them for a successful second (third, or fourth) life. Initiatives that fall within this include (but are not limited to): strategizing to maximize recycled fibers in our ranges, reducing the unused materials across the business and mapping the end-of-use pathways for our products; ensuring that products can be regenerated (through recycling or biodegradation techniques) at the end of their first life.</p> <p>Mapping and creating the infrastructure for responsible end-of-use is not a problem we can solve on our own, so we have begun preliminary conversations with research institutions and other stakeholders to see how we can play our part.</p>

Takeaways

- ✓ 1% of our main materials being rated **Champions** and 26% **Runner Ups** in our PML.
- ✓ We completed an additional **6 LCAs**, with a renewed focus on assessing the impact of our innovative material launches.
- ✓ We launched our first conversion to **regenerative capsule** in partnership with Arvind in India. Investing to support farmers transition to implementing **regenerative practices**.

Actions for 2023

- ☐ We're committed to sourcing all of our **virgin cotton from regenerative systems** by the end of 2026.
- ☐ In 2023, we will announce an additional **regenerative partnership** within a strategic fiber category.
- ☐ We will develop **PMLs** for different categories such as metals and plastics to inform our procurement strategy for trims, components, footwear and accessories. We will be launching our **packaging PML**, as we continue to identify the best packaging solutions available to us.
- ☐ We will pilot two **circular business models** in key markets.



PLANET

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Climate action



Biodiversity



Water

To tackle the environmental crisis, extensive efforts are needed to preserve, protect and restore the planet.

In 2022 we brought our decarbonization strategy to life and partnered with Plan A to evaluate our carbon footprint. We know that our environmental impact goes beyond tackling carbon, so we also kicked off our journey with regenerative practices.

Our three planetary pillars are climate action, biodiversity and water. Our journey for each pillar is evolving as we grow as a business. These pillars are interconnected, giving us a framework to tackle our impact in diverse and creative ways.

Planet roadmap towards Earth positivity

Climate action

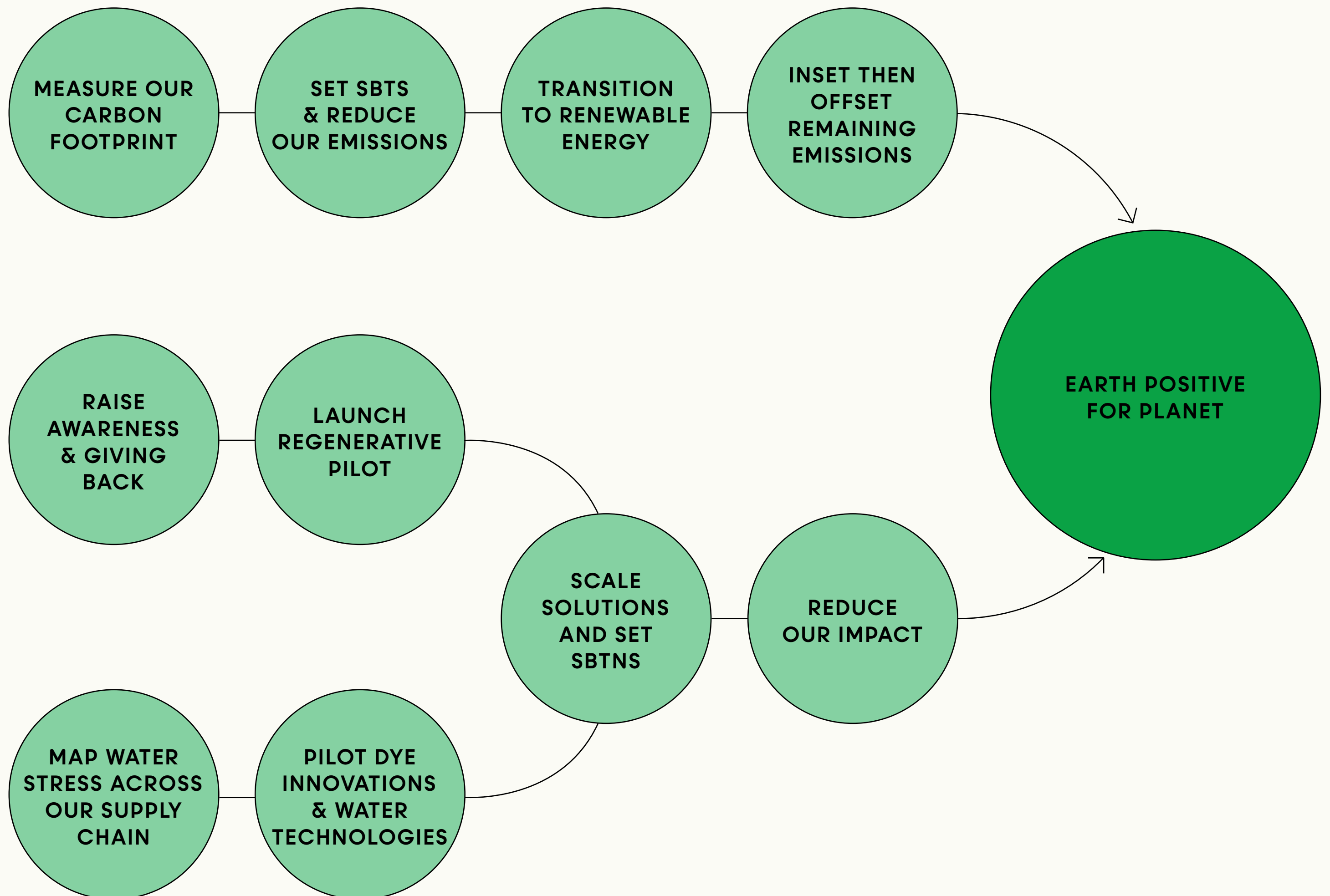
We are decarbonizing our business and have set science-based targets aligned to the SBTi. Our long-term goal is to reach net zero by 2040 across our value chain.

Biodiversity

We are raising awareness on the crucial importance of nature and investing in our supply chain through regenerative practices. We support initiatives which promote the restoration and conservation of nature.

Water

We are developing a water stewardship program for our value chain and incorporating new dyeing technologies to reduce our impact.



Climate action: getting to grips with our carbon emissions

In 2022, we partnered with Plan A to assist us on our journey to reach our science-based targets aligned with the Science Based Targets Initiative (SBTi). Plan A's end-to-end platform allows us to track, monitor and reduce our CO₂ emissions and with their support, we have been able to retrofit our decarbonization strategy in line with our growth and goals.

We have committed to:

- Achieving net zero in our operations by 2025 (Scope 1 & 2)
- Halving our emissions across our value chain by 2030 (Scope 1, 2 & 3)
- Being net-zero across our entire value chain by 2040 (Scope 1, 2 & 3)



What are science-based targets?

Science-based targets provide a clearly-defined pathway for companies to reduce greenhouse gas (GHG) emissions, helping prevent the worst impacts of climate change and future-proof business growth.

(Source: Science Based Targets Initiative)



What is net zero?

Net zero means cutting greenhouse gas emissions to as close to zero as possible, with any remaining emissions re-absorbed from the atmosphere by oceans and forests, for instance. Net zero is reached when a business has eliminated all the carbon emissions it can and then compensated the remaining emissions, i.e offsetting.

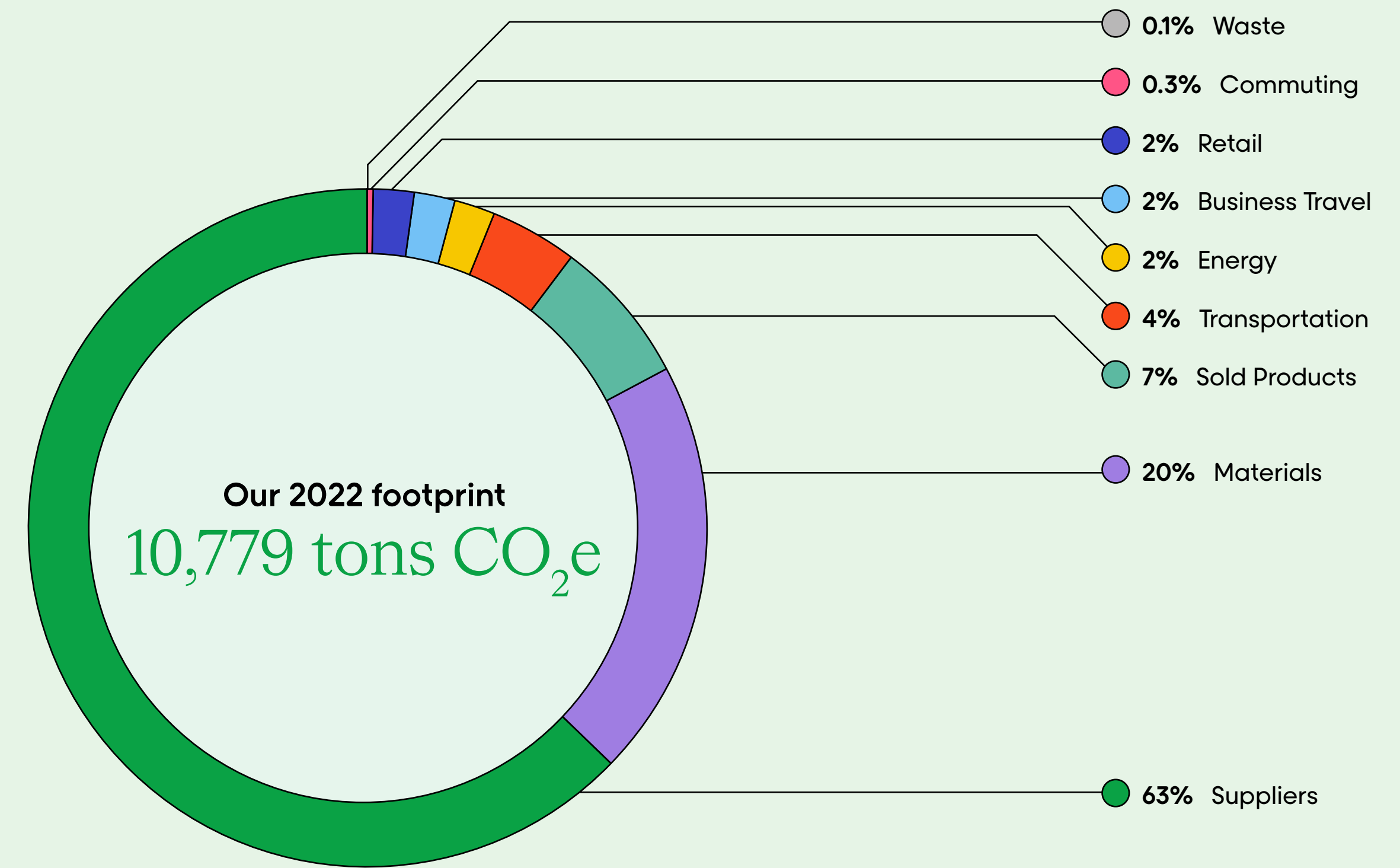
(Source: Plan A Glossary)

In 2022, we expanded our reach through our Environmental Management System (EMS). This improved the quality of the data that we were able to gather from our logistics providers, strengthening the credibility of our carbon reporting.

Life Cycle Assessments (LCAs) were also carried out on our main material and product ranges, tracking 13 different metrics including Global Warming Potential, Blue Water Consumption, and Energy Demand. This data went into determining our overall carbon footprint for 2022 and was used to review our progress from the previous year. For more information on how we use data, please refer to [Appendix](#).

We're glad to have determined our carbon footprint for 2022 with Plan A. Using these insights, we have been able to identify our emission hotspots to work out where we need to focus our efforts and implement our decarbonisation strategy.

% Greenhouse gas emissions breakdown by category



Energy Emissions from the heating and electricity consumed within our operations.	Materials Emissions from the raw materials and manufacturing process of our products.	Waste Emissions from the waste generated in our operations.
Suppliers Emissions from our purchased goods not for resale, and services.	Sold products Emissions from the use, treatment and end-of-life of sold products.	Retail Emissions from permanent retail concessions.
Transportation Emissions from the upstream and downstream transportation and distribution of products from our suppliers, across our own operations, and for the delivery of sold products.	Business travel Emissions from the transportation of employees for business-related activities in vehicles not owned or controlled by PANGAIA such as aircraft, trains and passenger cars.	Commuting Emissions from the transportation of employees between their homes and workplaces.

Our decarbonization strategy

In 2022, we maintained our partnership with Carbon Footprint. They helped us calculate the associated greenhouse gas (GHG) emissions of our pop-up retail spaces using data from the building materials, employee travel and energy powering the shop floors. We also continued our work with Green Story. They supported us with a portfolio of accredited carbon token projects for offsetting these events and offsetting our products which underwent an LCA.

We're glad to share that in 2022:

7 of our pop-up retail spaces were offset with credible carbon credits.

Our portfolio of carbon credits was made up of a mixture of renewable energy, social and reforestation projects; Darfur Cookstoves, Harmanlik wind power, SeaTrees and Hong Phong Solar Project.

2022 also marked the beginning of PANGAIA supporting the Climate Transformation Fund through our partnership with Milkywire. We implemented an internal carbon tax that is channeled into the innovative climate projects supported by this fund.



© Justdiggit. A project supported by the Climate Transformation Fund.

Climate Transformation Fund (CTF)

This is an initiative by Milkywire, in collaboration with WRLD Foundation Sweden and WRLD Foundation US. The donation fund supports the most cost-effective and sustainable climate solutions for reaching global net zero. That means financing pioneering climate solutions and supporting new and unproven technologies incorporating projects within durable carbon removal. For more information and examples of the projects we support, visit their [website](#).

We decided to set a lower price of 10 USD per metric ton of carbon across scopes 1,2 and 3 of our emissions and raise this over time as we grow and reduce our emissions. This tax acts as a tool for us to take responsibility for reducing our carbon footprint across our entire value chain, even where we don't have operational control.

i **Internal Carbon tax**

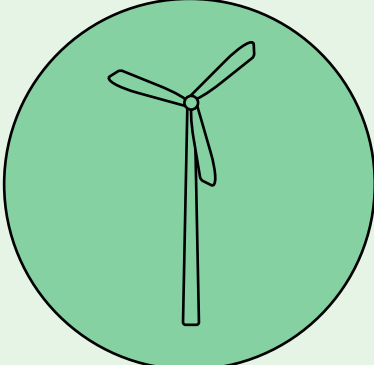
These are fees assigned to company emissions to generate money to be spent on external climate projects. The fee can be differentiated between emissions that a company controls (Scope 1 & 2) and a lower fee for where emissions are shared (Scope 3).

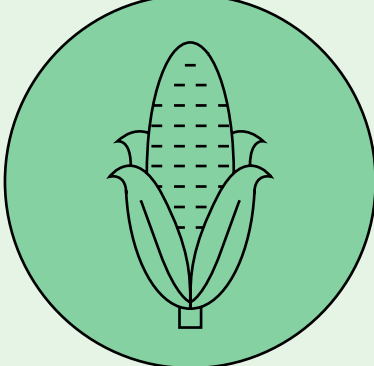
(Source Milkywire whitepaper)

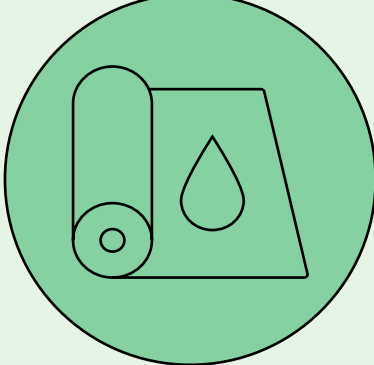
i **What is scope 1,2 and 3?**

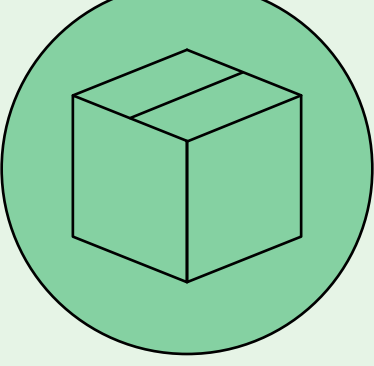
Greenhouse gas emissions are categorized on a scope 1-3 basis. Scope 1 and 2 emissions are those we have a direct influence and control over. For PANGAIA this includes our offices, joint ventures and research facilities. Scope 3 emissions are those associated with our value chain, which we are indirectly responsible for. For us, this covers our suppliers (including temporary retail and warehouses), business travel, employee commuting, transportation (upstream and downstream), waste and materials (production and processing). This is where the vast majority of our GHG emissions take place.

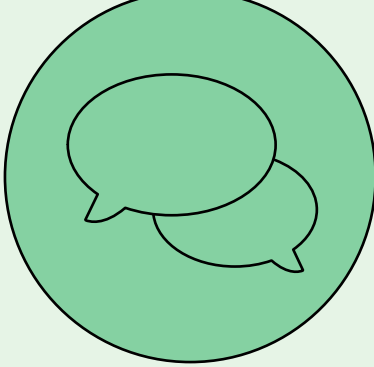
Our decarbonization strategy

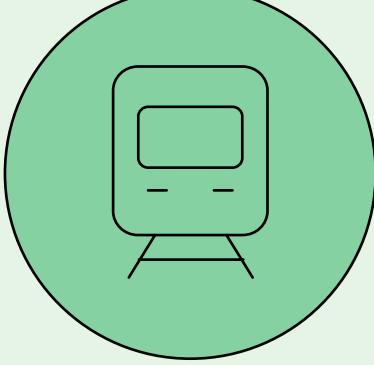
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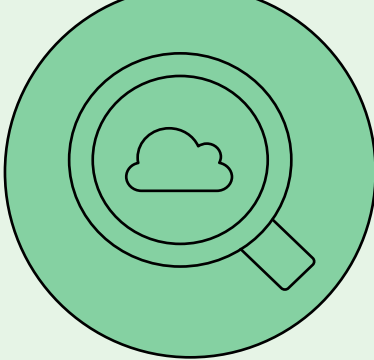
Renewable energy
Transition to renewable electricity at our offices and other sites, and encourage our partners to do the same.
- 

Low-emission materials
Continue to drive innovation to develop, use and share more sustainable and climate-friendly materials.
- 

Low emission dyeing
Work with suppliers and peers to introduce better, less polluting and lower carbon manufacturing processes and systems.
- 

Low emission logistics
Encourage our teams and customers to consider more sustainable choices, including how and when garments are delivered.
- 

Low emission campaigns
Engage our communication partners to eliminate carbon from our messages to customers, and create a community for a lower carbon world.
- 

Smarter travel
Traveling less, taking fewer flights, embracing new technology and ways of working.
- 

Data quality
Better carbon accounting data and investments in good quality carbon offsets for the carbon we can't eliminate from our activities and for those of our partners.

Biodiversity loss and climate change are inextricably linked

We cannot deliver our decarbonization strategy without mitigating biodiversity loss. That is why we are addressing our environmental impact holistically and using insetting as our solution.

Our 'in-conversion to regenerative cotton launch' released in 2022 is the first step in our broader ambition to explore insetting initiatives. Through insetting, we will be able to promote biodiversity and tackle climate change simultaneously. After exploring different opportunities in 2022, we aim to support farmers to transition to regenerative practices and to scale these regenerative systems. For more information on our in-conversion capsule and future regenerative intentions, please refer to the [Materials & systems](#) chapter.



What is insetting?

The International Platform for Insetting describes insetting initiatives as "interventions along a company's value chain that are designed to generate GHG emissions reductions and carbon storage and at the same time create positive impacts for communities, landscapes and ecosystems."

(Source: International Platform for Insetting)

By working with 11 grassroots tree planting and tree protection NGOs from 15 countries all over the globe, we've been able to support local communities, train restoration leaders and create job opportunities. We also continued our support of the Bee the Change Fund.

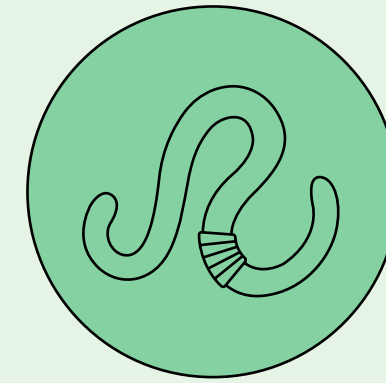


© Bumblebee Conservation Trust

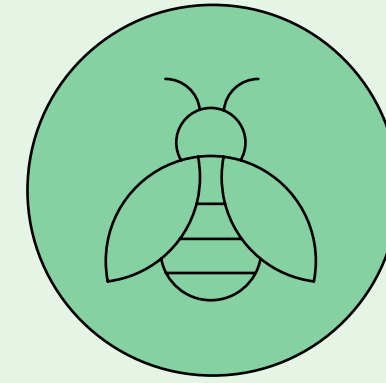
Bee the Change: Bumblebee Conservation Trust

In 2022 with our support through the Bee the Change fund, the Bumblebee Conservation Trust was able to hold 15 habitat work days across 15 sites. This consisted of eight volunteers planting early spring forage, and advice being given to four farmers and two councils on improving floristic diversity, abundance and seasonal length for habitats for pollinators. In addition to that, bumblebee identification courses and talks were held for 400 people, building further awareness.

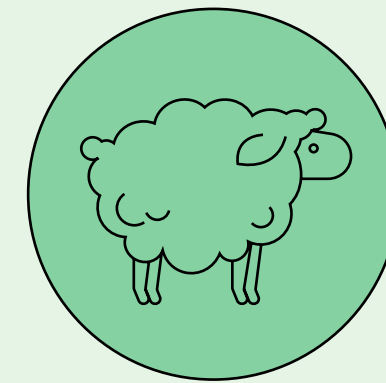
Biodiversity at PANGAIA means



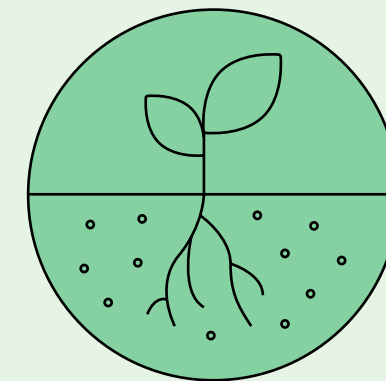
Embracing organic and regenerative practices



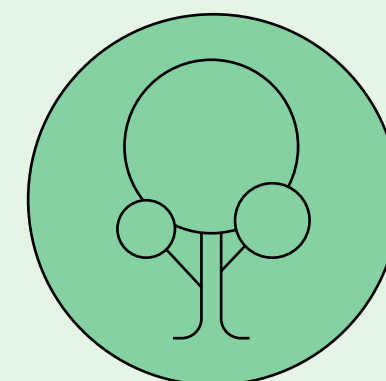
Actively restoring ecosystems and protecting wildlife and local habitats



Ensuring animal welfare standards are respected



Supporting soil health



Conscious land use and forest management



© Digby Douglas-Dufresne, Milkywire



© Global Forest Generation

1 million trees planted and saved



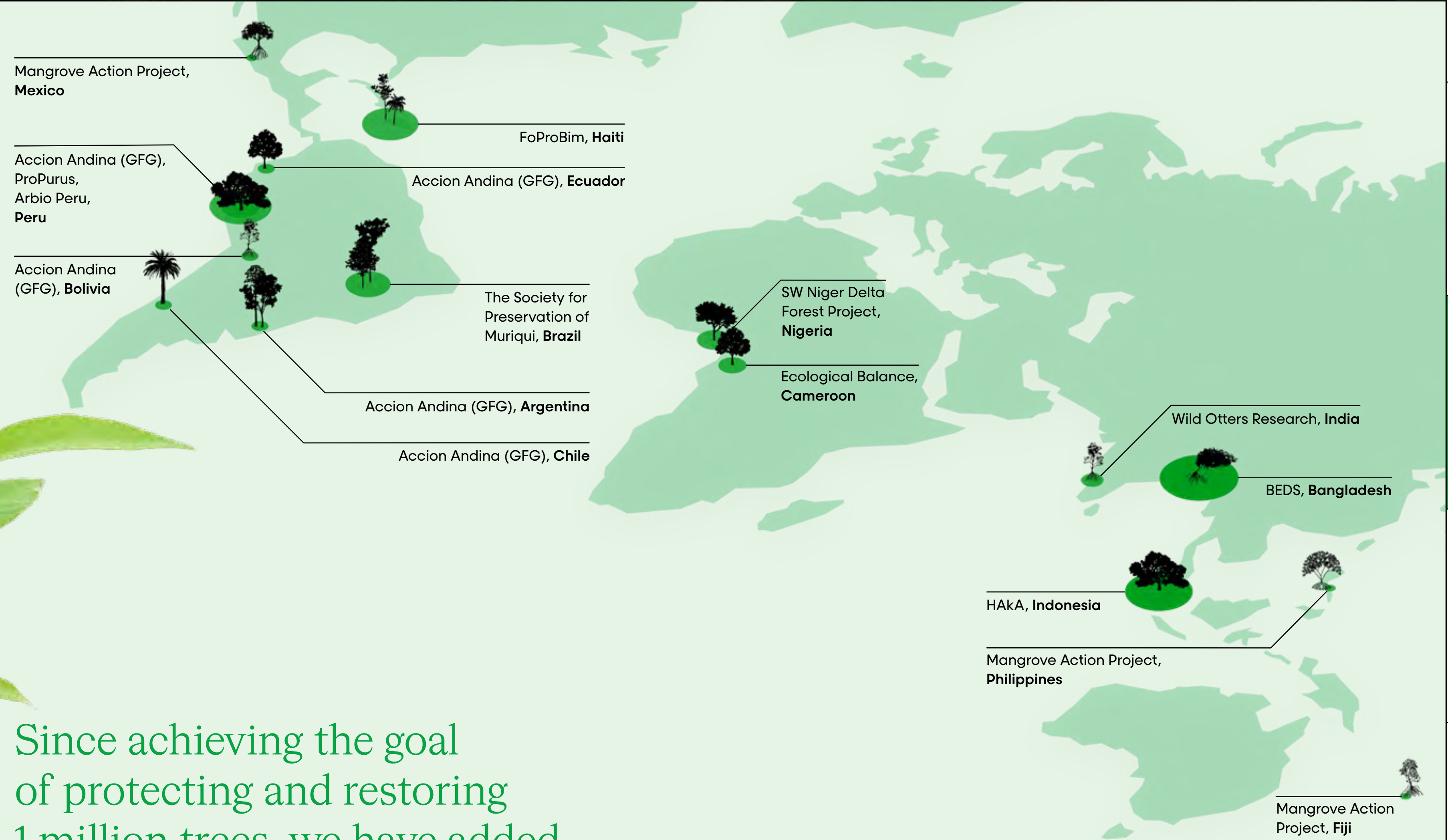
© Global Forest Generation

In 2022, we hit our first milestone of planting, protecting and restoring 1 million trees through our Tomorrow Tree Fund, powered by Milkywire.

Since launching the Fund in 2020, contributing 1 million trees to the 1 trillion trees pledge has been a commitment from us and our network of partners to support global reforestation and conservation initiatives that contribute to restoring nature.



Since achieving the goal of protecting and restoring 1 million trees, we have added a further \$144k contribution





How can innovation provide solutions?

Water is used across our value chain for material processing, dyeing, bleaching, cooling, cleaning and printing processes.

We have identified that the majority of our water footprint ties back to the production of our apparel and the use phase of our products. To tackle this, in 2022 we explored various innovations around dyes to create apparel using chemicals with a lower impact on water. These included our Recyrom Capsule, our Food Dye Capsule and our Natural Dye Capsule. We also tackled microfiber pollution and were recognized for our efforts in our collaboration with MTIX on the development of multiplexed laser surface enhancement (MLSE®) technology.

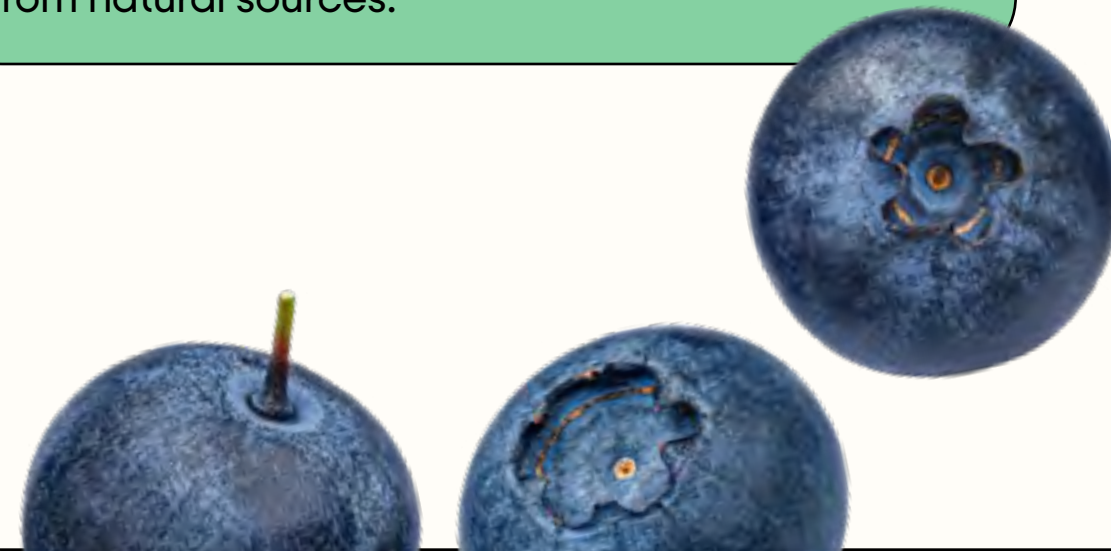
To ensure that we have an understanding of the water risks within our supply chain we have continued to develop local (country-level) risk assessments that cover both social and environmental challenges in the main sourcing countries where we operate: Portugal, Türkiye, Italy and Romania. By doing this we will be able to map out where better water management engagement needs to be prioritized in our supply chain. We aim to work in partnership with our suppliers with wet processes to understand their use of water and develop plans to reuse, reduce and recycle water more efficiently.

Although we are still early in our journey on water stewardship, our ambition is to implement best practice in our water processes. We will align ourselves with the Science Based Targets Network (SBTNs) in 2023 for freshwater and continue to scale successful dye and material innovations.



Food dyes

Traditional textile dyeing has a heavy environmental footprint, both in terms of chemical and water usage. Color is in our brand DNA so we're constantly searching for new solutions and partnering with innovators to scale the next generation of dyes using less harmful chemicals that are kinder to the planet and reduce our impact on water. Last year we launched our food dyes collection, colored with dyes derived from food waste. This reduces the use of chemicals in the dyeing process and diverts waste, as the dyes are made from ingredients extracted from food waste from food processing plants and farms. 90% of the ingredients of these dyes are made from natural sources.



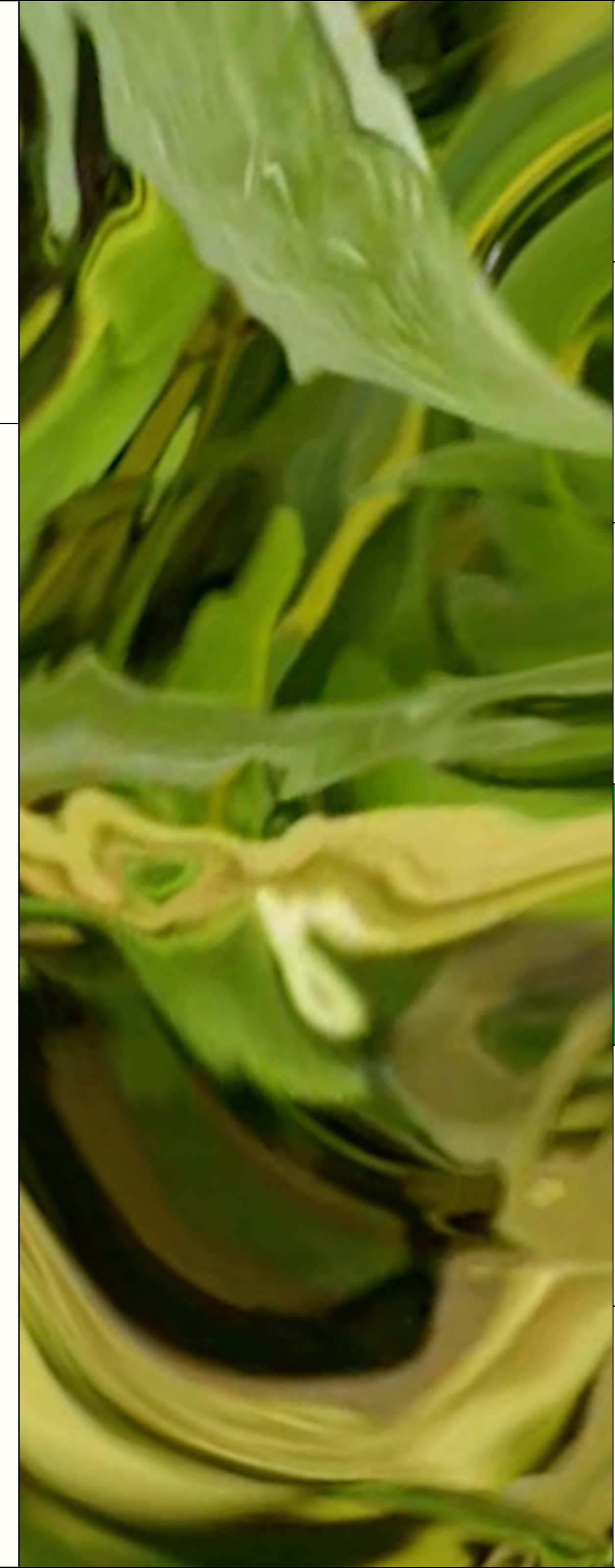
The Microfiber Innovation Challenge

In June 2022, together with MTIX, we won the Microfiber Innovation Challenge, which aims to stop microfiber pollution. MTIX's novel application of multiplexed laser surface enhancement (MLSE®) technology modifies the surfaces of fibers within a fabric in order to prevent microfiber shedding. To find out more about MLSE®, please visit: mti-x.com



Our microfiber commitment

The solution to prevent microfiber pollution and its consequences are a work in progress for us. That's why we've joined The Microfiber Consortium (TMC) to help us navigate this space. As part of this consortium, we have signed an agreement to work towards zero impact of fiber fragmentation from textiles to the natural environment by 2030. We have also made a commitment to test a 5 fabrics per year to the TMC test method measuring fiber fragmentation. This is an important step forward in progressing the research and understanding of microfiber shedding.



Takeaways

Climate Action

- ✓ We partnered with **Plan A** to determine our **carbon footprint** for 2022 using their certified methodology.
- ✓ We extended our **Environmental Management System** and improved our data quality.
- ✓ We **offset** all 7 of our **pop-up retail spaces** with verified carbon credits.
- ✓ We set up an internal **carbon tax** on our Scope 1,2 and 3 emissions and invested this into cutting-edge carbon capture innovations through the **Climate Transformation Fund**.

Biodiversity

- ✓ We hit our milestone of planting, protecting and restoring **1 million trees** through our Tomorrow Tree Fund powered by Milkywire.

Water

- ✓ We won the **Microfiber Innovation Challenge** in partnership with MTIX, which aims to stop microfiber pollution through multiplexed laser surface enhancement (MLSE®) technology.

Actions for 2023

Climate Action

- We commit to **transitioning to renewable energy** within our own operations first and then extending it to our suppliers.
- We will increase our internal **carbon tax** for our scope 1 and 2 emissions to continue supporting cutting edge carbon technologies through the Climate Transformation Fund.
- We will get our targets approved by the **Science Based Targets initiative (SBTi)**.

Biodiversity

- We will use guidance from the Science-Based Targets for Nature (SBTNs) to feed into a **biodiversity strategy and governance framework** for 2024 aligning with their principles.
- We will support philanthropic efforts that promote biodiversity and raise awareness through the **Bee The Change** and **Tomorrow Tree Funds**, as well as form a global coalition to save bees and other pollinators.

Water

- We commit to increasing the visibility of our material suppliers and engaging with our wet processing suppliers, such as dye and printer houses, on their **water practices**.



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Our supply chain

At PANGAIA, we support a world free of exploitation and discrimination, that champions respect, dignity and wellbeing. We aim to have a positive impact on the people that touch our value chain and this means supporting the individuals who make up our teams and those individuals we depend on through our partners.

Our aim is to empower the people in our value chain by responding to their needs and by cultivating responsible sourcing practices where human rights are respected and promoted. PANGAIA's social impact strategy is divided into two interlinked pillars; act as an ethical business and positively impact lives.

We analyzed the salient human rights issues in our supply chain using a needs-based approach. This assessment gave us four areas that are most pertinent to the people our value chain touches: fair livelihoods, having a voice, equity and wellbeing. These issues are often intrinsically linked however each area of focus requires a tailored approach.



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Our People strategy



Acting as an ethical business

Supporting human rights & decent work

We're committed to supporting decent work and respecting internationally recognized rights. To detail these commitments we have developed new policies including a [Human Rights Policy](#), [Child Labor & Young Workers Policy](#), and [Subcontractor Policy](#).

We have become members of the Fair Wear Foundation to learn from their expertise, share best practices from other members, use their tools and be held accountable through reporting. We intend to work closely with Fair Wear to monitor and improve labor conditions in the factories where our products are made.

PANGAIA's role as a materials science company embraces innovation and explores new and sometimes untraditional materials. These supply chains might sometimes sit outside conventional apparel and accessories supply chains so we need to employ bespoke approaches to due diligence that use other industries' standards to assess social impact.

“We are all interdependent on each other. It's everyone's right to live on this planet and we have to let them live well.”

Smallholder regenerative cotton farmer
Maharashtra, India

i **How does regenerative agriculture support human rights?**

Regenerative systems embrace social justice and indigenous practices which bring immense social benefits, reviving the restorative practices that are central to regenerative agriculture which have been used for generations. It's important to recognize that impactful regenerative systems are developed in tandem with the local context.

From conversations with the farmers that are in conversion to regenerative, they see the benefits the practices have on the land and for their families. Through our partnership with Arvind in India, we have engaged two groups, each with 500 farmers (read more in the [Materials & systems](#) chapter) in the villages of Chincholi and Palasgaon in Maharashtra.

Working with the non-profit Sanjeevani Institute for Empowerment & Development (SIED) the farmers are trained on regenerative practices and principles as well as being supported through community engagement activities, such as a health camp. To ensure the standards on the farms reflect the values in our Code of Conduct, the project has achieved the Fair for Life certification.



Being a good, reliable & fair partner

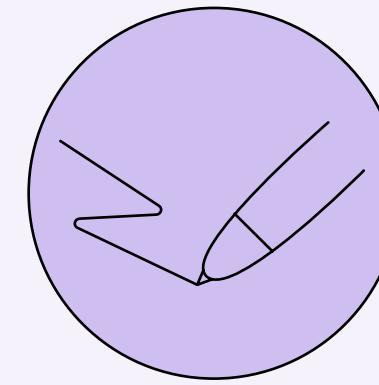
For us, responsible sourcing is about finding the right supplier to build a partnership—so we select suppliers who share the same values as us and are aligned with our Earth-positive mission.

We acknowledge that there is often an imbalance of power between brands and their suppliers, therefore it is a continuous goal to be fair, transparent and open to all partners. There is an inherent link between how a company’s purchasing practices impact its suppliers and ultimately the workers. To help us navigate this, in 2022 we joined the Learning and Implementation Community, which is organized by the MSI Working Group of the Common Framework for Responsible Purchasing Practices. Being part of this community includes committing to 5 principles to guide purchasing practices. We brought together commercial and impact teams to learn from this multi-stakeholder community.



Finding the right partners
Our onboarding process gives preference to suppliers who are on a similar journey of monitoring social and environmental impact. We conduct due diligence with each new supplier to ensure they meet our requirements and share our values and ambition (to read more about this process see our [Modern Slavery statement 2021](#)). We currently focus our finished goods production in 5 countries with the majority of our products made in Portugal. Our key suppliers have not changed since our founding, and we have developed close relationships with these partners to enable and progress our innovation.

Common framework for responsible purchasing practices



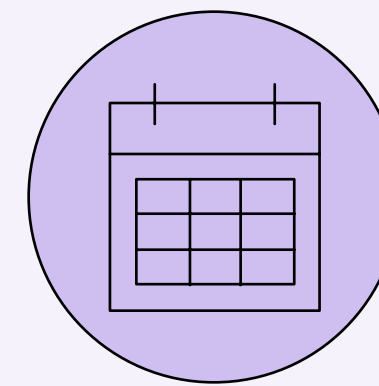
Integration and reporting

In order to implement changes to purchasing practices, brands have top leadership buy-in and commitment, and have a thorough understanding of existing suppliers, purchasing systems and possible negative impact on human rights—using this to decide on priorities that feed into an agreed improvement plan.



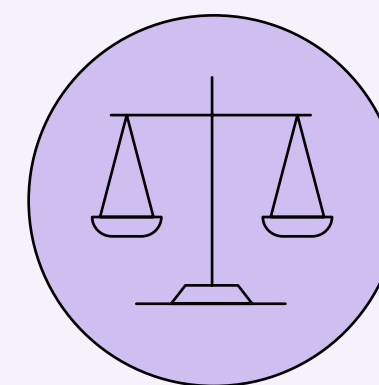
Equal partnership

The brand and their suppliers respect each other as equal business partners; engage in respectful sourcing dialogue; and pursue win-win situations, with a shared responsibility to improve working conditions.



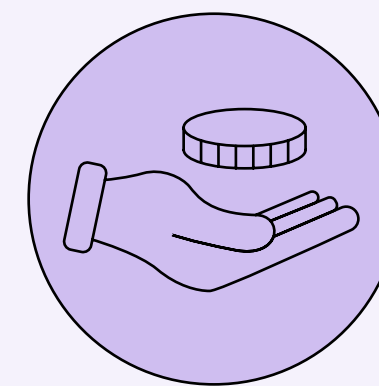
Collaborative production planning

Critical path and production planning is done collaboratively between brand and supplier.



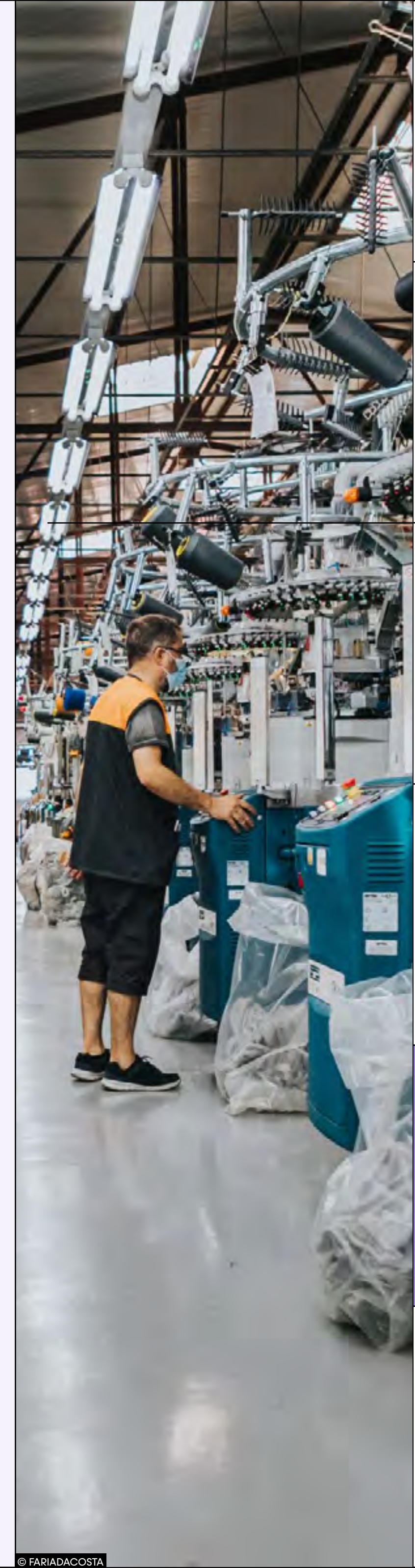
Fair payment terms

The brand and suppliers agree on fair and transparent terms that include all relevant information regarding the payment procedure and do not place a disproportionate burden on one party. Contractual obligations are honored at all times. Payments are made in full and on time.



Sustainable costing

The costing procedures and levels of the purchasing company reflect and support wage increases and sustainable production. Prices cover all costs of production in line with responsible business conduct and allow for a reasonable and maintained supplier profit margin.





Being transparent and open

Each year we expand our visibility of where our products are made and in what conditions.

We're committed to being open about our mapped supply chain by regularly publishing a list of our suppliers through the [Open Supply Hub](#). In 2022 we progressed with mapping our cut, make and trim subcontractors and suppliers who perform product processes, such as printing, dyeing and embroidery.

To help guide our approach to subcontracting, our new policy outlines the process for suppliers disclosing any outsourced production and seeking PANGAIA's approval. We have also formalized our approach to homeworking within this policy as we see it as a valuable source of income and banning the practice only forces it to be hidden with potentially worse conditions.

In 2022 we started engaging with our key mills (both fabric and yarn) on social sustainability to better understand these facilities who are making our fabrics.

20
Manufacturing factories (Tier 1)

20
CMT/Manufacturing subcontractor (Tier 1)

13
Process Subcontractors (Tier 2)

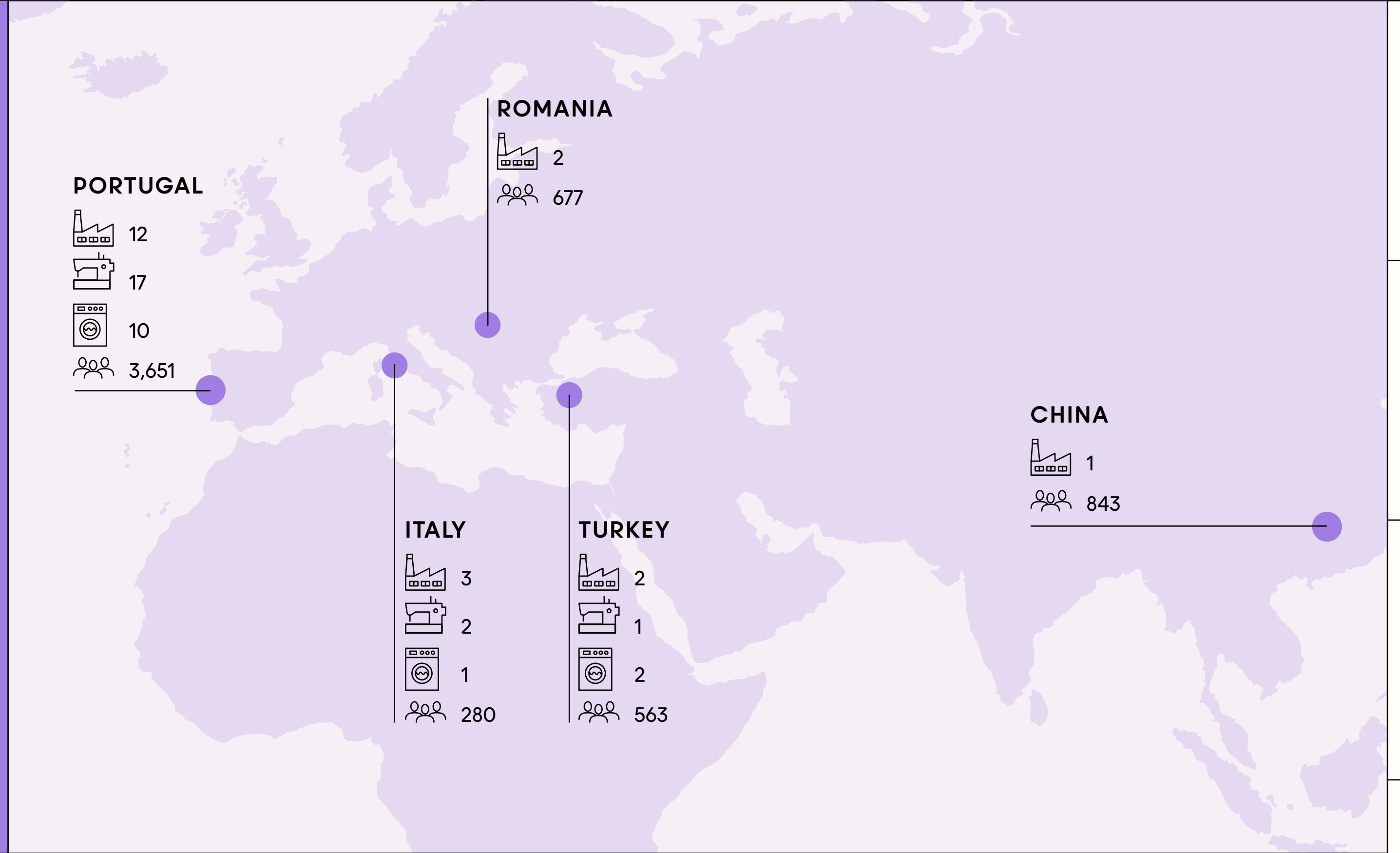
5 Sourcing countries

88% of our finished goods sourced from Portugal

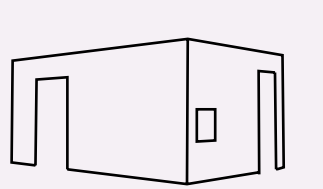
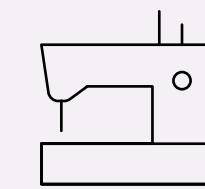
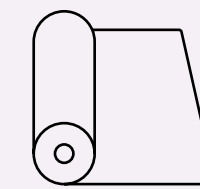
5,952
Total workers (Tiers 1 + 2)

70% women in manufacturing factories

30% men in manufacturing factories



At PANGAIA we divide our supply chain into Tiers 0-5, which represent general production processes moving from raw ingredient to a finished product



TIER 5	TIER 4	TIER 3	TIER 2	TIER 1	TIER 0
Raw fiber, ingredients or feedstock source	Fiber processing	Material production or component supplier	Material processes or product enhancements	Finished product	Office, retail & distribution center
Origin of raw fibers, ingredients, or feedstock.	Processor of raw fibers or feedstock.	Material manufacturing and processing and component production.	Provider of one or more processes to materials or enhancements to the product.	Factory which cuts, sews and finishes product and ships to PANGAIA.	Distribution, retailing, offices, research.
e.g. cultivation (farm, forest, mine, oil field), waste collection (recycled inputs)	e.g. fiber producer, refiner, ginner, recycling/sorting centre, smelting, refiners	e.g. mill (spinning, knitting, weaving), tannery, hardware, components, trims, molding (shoe soles), fabric dyeing, fabric treatment, labels, packaging, casting	e.g. printer, garment dyeing, fabric treatment, electroplating, laundry/wash house, embroiderer, pleating, tooling, cutting, lasering, embossing, embellishment, quilting, firing	e.g. stitching, assembly, quality control, packing, approved Cut, Make, Trim subcontractors (indirect relationships)	e.g. warehouse, stores, offices, research centres

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Embedding robust due diligence and verification processes

In 2022, we continued to lay the foundations for our due diligence approach and introduced new processes into our business that aim to embed ethical practices across departments.

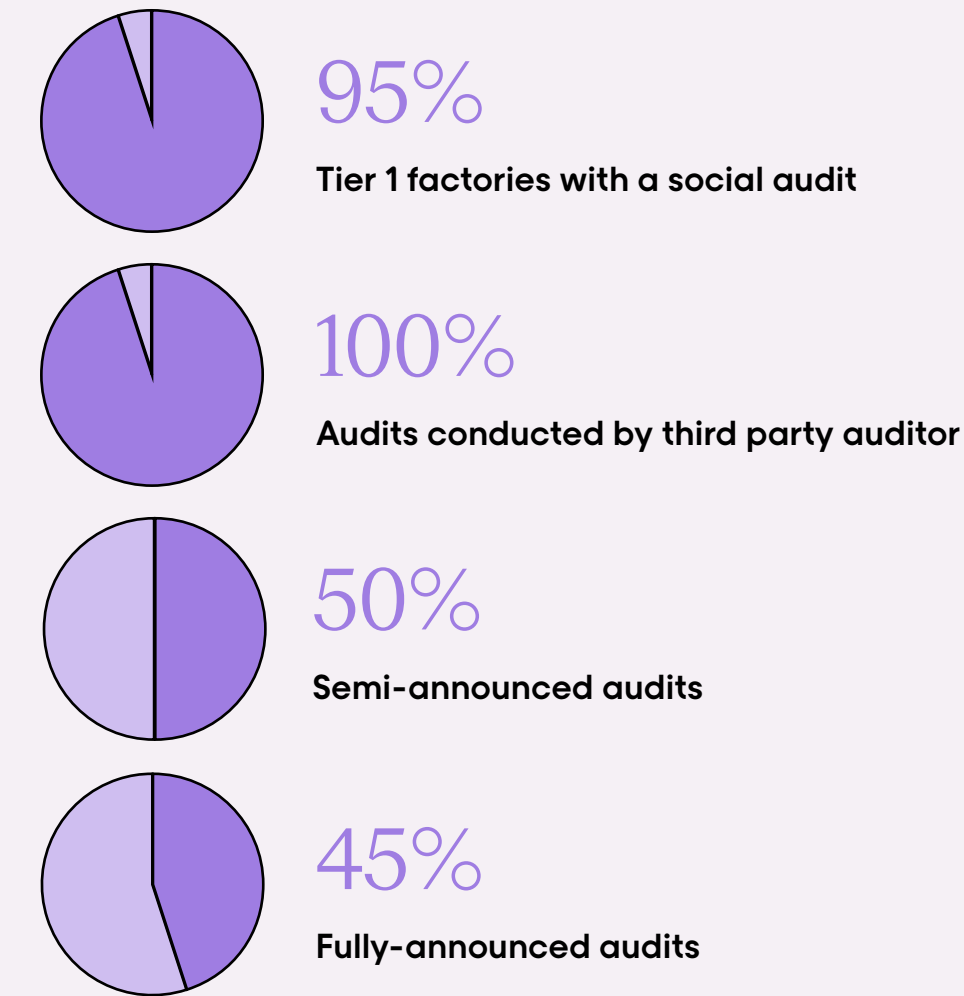
We conduct assessments on national and regional risks (see our [Modern Slavery statement 2021](#) for details), product-specific risks and how our engagement could either reduce or increase risks of adverse impacts on people. Regular supplier visits and an ongoing dialog bolster our monitoring, along with social audits which we use to verify conditions in the top tiers of our supply chain. We recognize that auditing is not always ideal for capturing risk to workers, yet it is a useful tool to help us gain a better insight, understanding, and alignment of the conditions across our partners. They are also an important mechanism for data collection, benchmarking factory performance and identifying risks or trends.

Factory performance

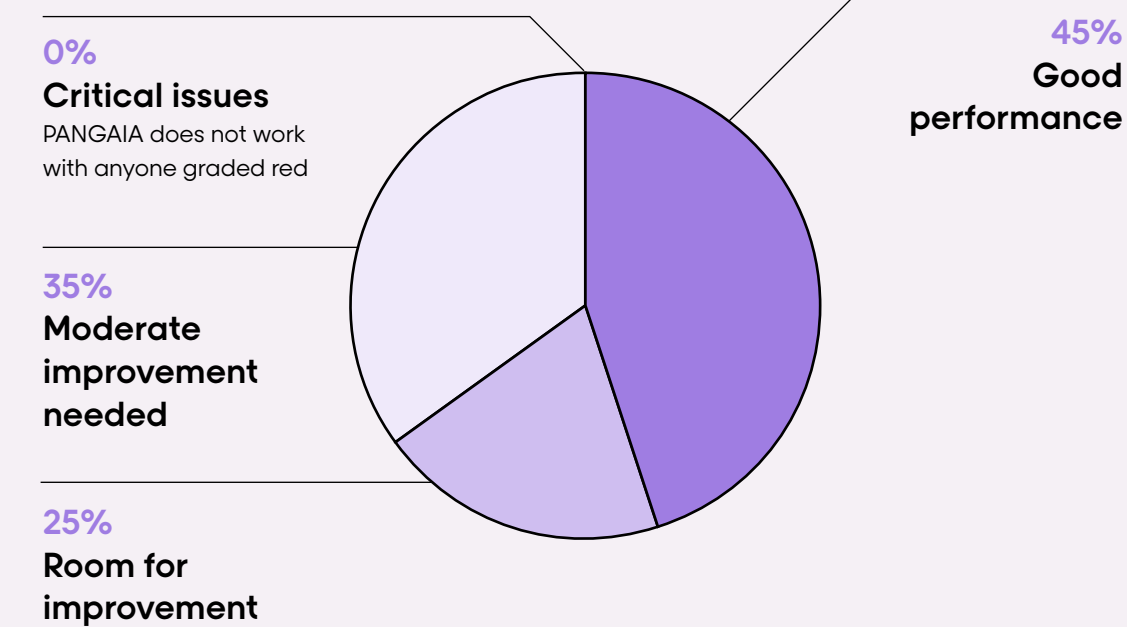
Our third-party supplier audits are reviewed by our impact team who checks all findings and assigns a grading that denotes factory performance. This grade reflects both the severity and significance of the non-compliances at the facility as well as the presence of good practices. We don't expect factories to be perfect when we start working together, but we do expect we do expect that our partners will be willing to work collaboratively to continuously improve and address issues when they arise.

Non-compliances are issues raised during an audit that contravene law or our [Code of Conduct](#). These can be deemed as minor, major or critical concerns. The most commonly found non-compliances in our factories are related to health and safety, followed by wages & benefits, working hours and management systems. These trends follow the wider industry at large, however, we do find fewer concerns over topics such as discrimination, harsh treatment or forced labor, as audits are not the best tool for uncovering such issues. We do not only review non-compliances but also analyze management practices against our areas of positively impacting lives, such as worker representation, progress to living wages, gender equality and wellbeing practices or initiatives.

Breakdown of audits



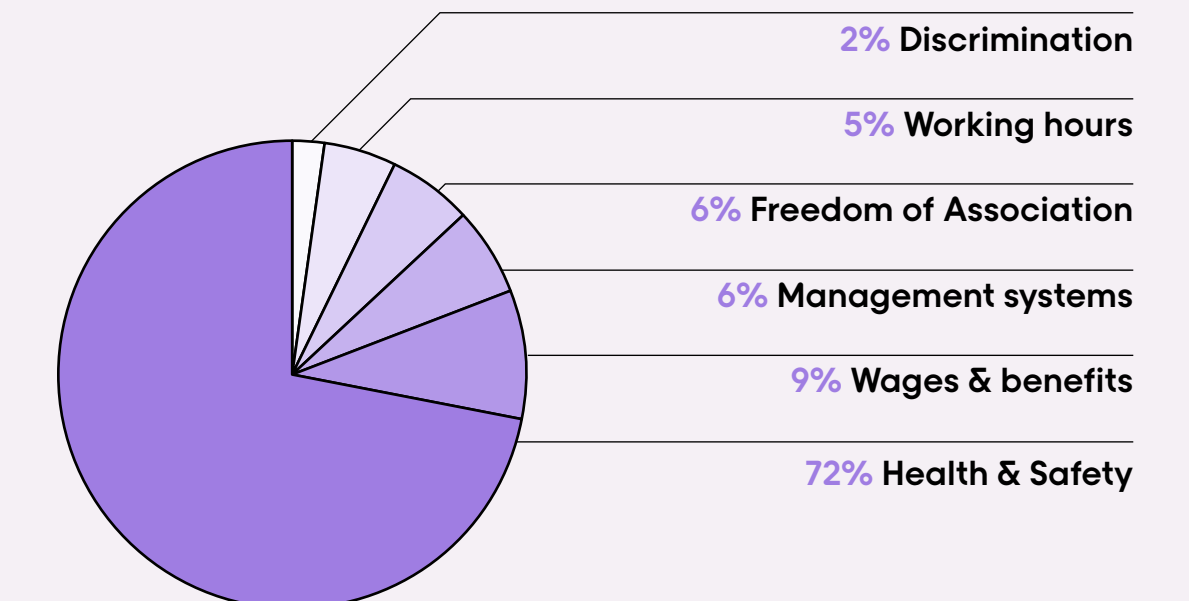
How our factories perform



© Petrotex

Breakdown of non-compliances by category

Our approach to assessing our supply chain is based on problem-solving rather than fault-finding. This means the most important aspect of our supplier's performance is a willingness to remediate issues. After reviewing the non-compliances, we discuss these with factories where improvements are needed to understand the causes and how they can be remedied. Once a corrective action plan is agreed we keep a detailed record of how the improvements are going over time and where factories might need more support.



© Clothius

Material and fiber supplier monitoring

For some of our raw materials, we directly purchase from cultivators. We have close relationships with these producers, and where feasible, a member of the PANGAIA team has visited the site to understand their practices and innovations.

From our connections further down the supply chain, we are improving our understanding of the context and needs of the communities around our supply base. For some of our innovations, we use non-conventional materials from less traditional textile supply chains. We use a bespoke assessment of the risks and needs of people, and a more nuanced approach for smaller, less traditional suppliers. Even with preferred materials (see the [Materials & systems](#) chapter for definitions) there might be less of a planetary impact but a heightened social risk.





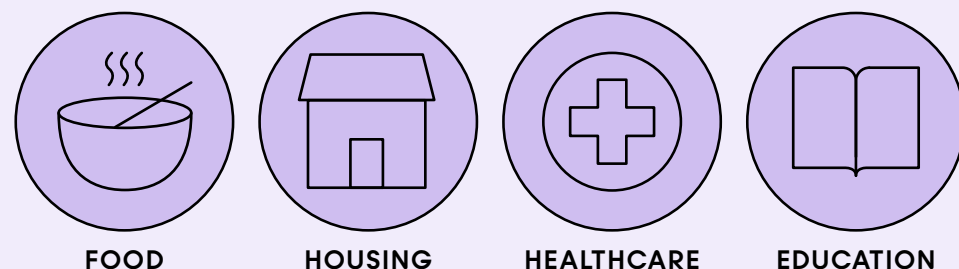
Advancing living wages and fair livelihoods

Improving the wages of workers is a complex issue to solve as it is often influenced by wider social, economic and political factors.

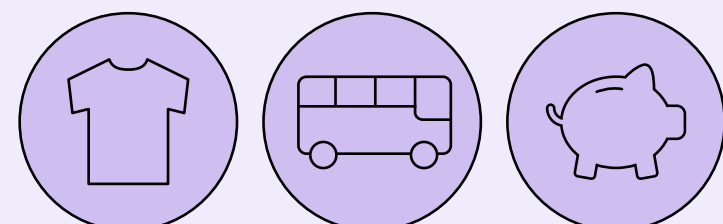
There isn't a standardized roadmap of what enabling fair livelihoods looks like because there isn't even a unanimous agreement on what a living wage is. Nonetheless, we have the ambition to advance decent income within our business (read more on this later in our [Employee](#) section) and enable progress toward fair livelihoods in our supply chain.

What makes up a living wage?

A living wage means a wage which offers individuals and their dependants enough to live on (with a small amount of saving), we subscribe to the [Anker Methodology](#) of what aspects should be included in this.



FOOD HOUSING HEALTHCARE EDUCATION



CLOTHING TRANSPORT SAVINGS

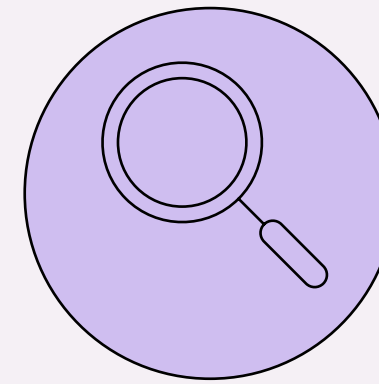
To ensure fair wages, we need to know where we are today. In 2022, we partnered with WageIndicator to provide us with living wage data in our key sourcing territories. We then benchmarked audited wages from our suppliers against local living wages to understand the gap between current remuneration and our ambition. In Portugal, for example, where the majority of our products are made, we know that the legal minimum wage accounts for 67% of the family living wage, in our factories we often find that that majority of workers are paid above the legal requirements. Whilst this is a positive step it is not always the case and still means that we need to work with our suppliers on closing the gap.

For the raw materials we invest in directly, we're working towards verifying if a fair price is paid and distributed to the people who grew, collected or harvested the input. We have also de-risked our regenerative cotton investment, meaning that if the farmers suffer any yield loss it will not affect their income.

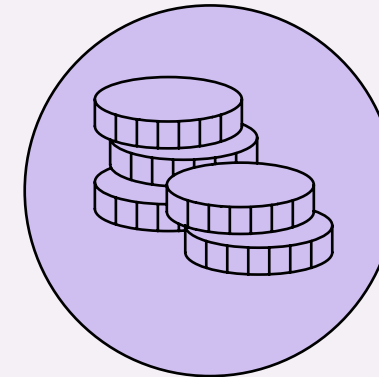
Tier 1 facts on wages

- 75% of factories pay via bank transfer.
- 82% of factories pay employee's wages monthly.
- 100% of factories pay an enhanced overtime premium that meets ILO requirements.

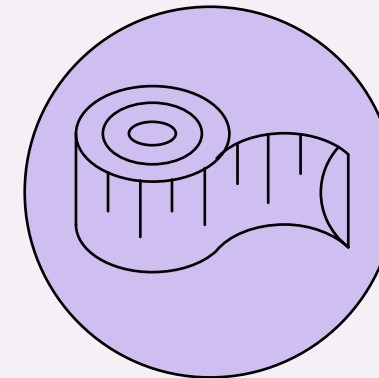
Our approach to living wages*



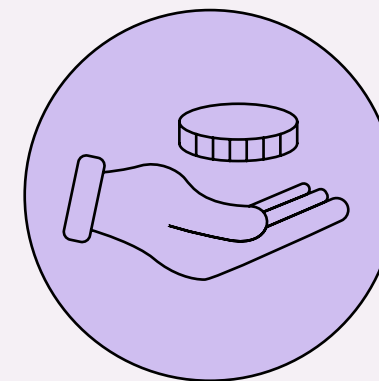
1. Understand landscape



2. Identify living wage



3. Measure gaps

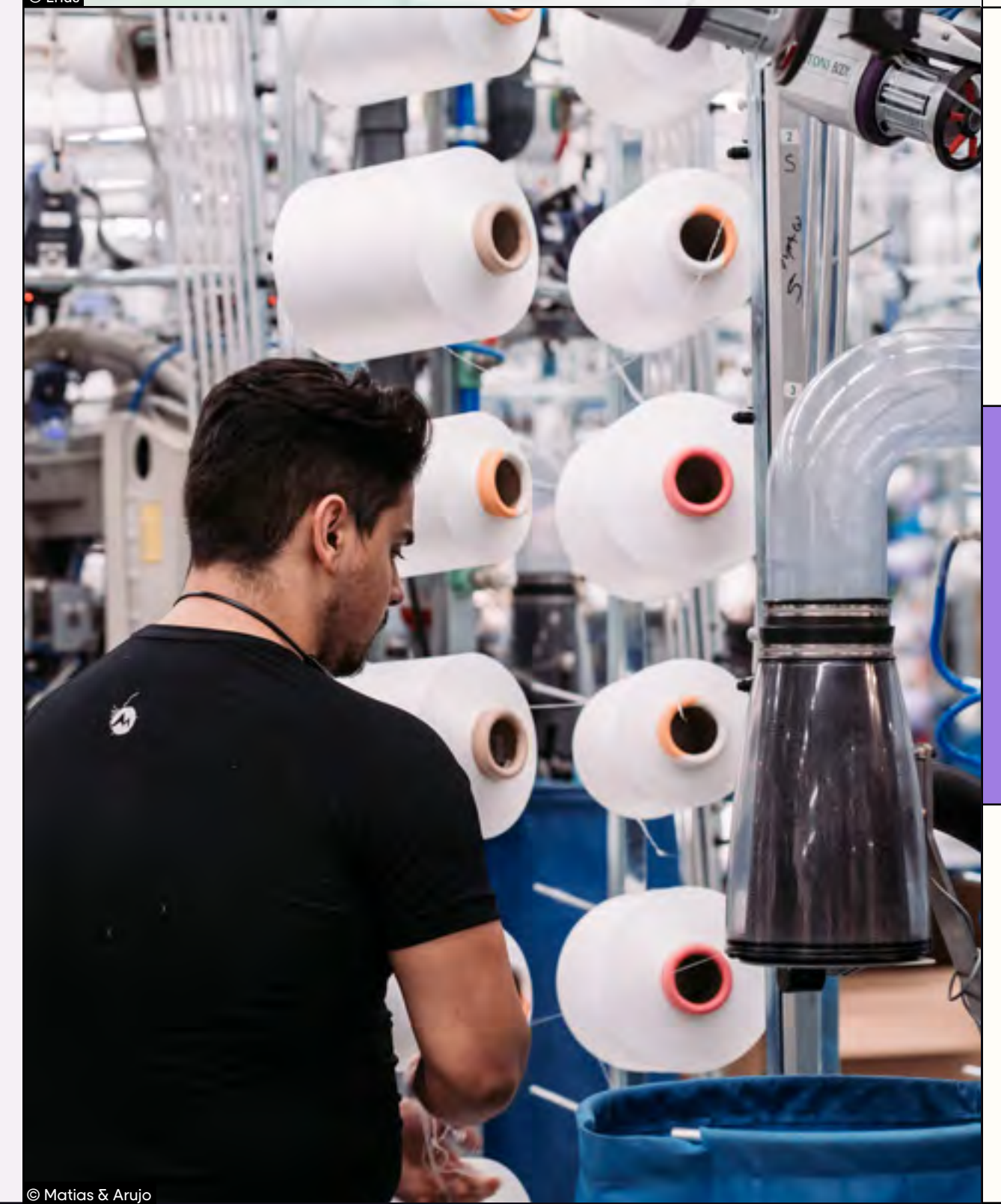


4. Take action to close gap



5. Report and share learnings

*inspired by the IDH living wage action plan.

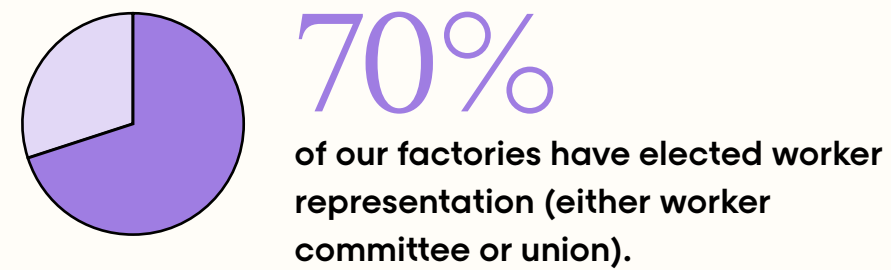




Listening and amplifying workers' voices

Giving workers a voice allows them to feel comfortable and confident in raising concerns without the fear of suffering any prejudice or retaliation of any kind.

Workers should know that their feedback is important and that they are heard. Collective Bargaining Agreements and Freedom of Association are essential to the improvement of other labor rights.

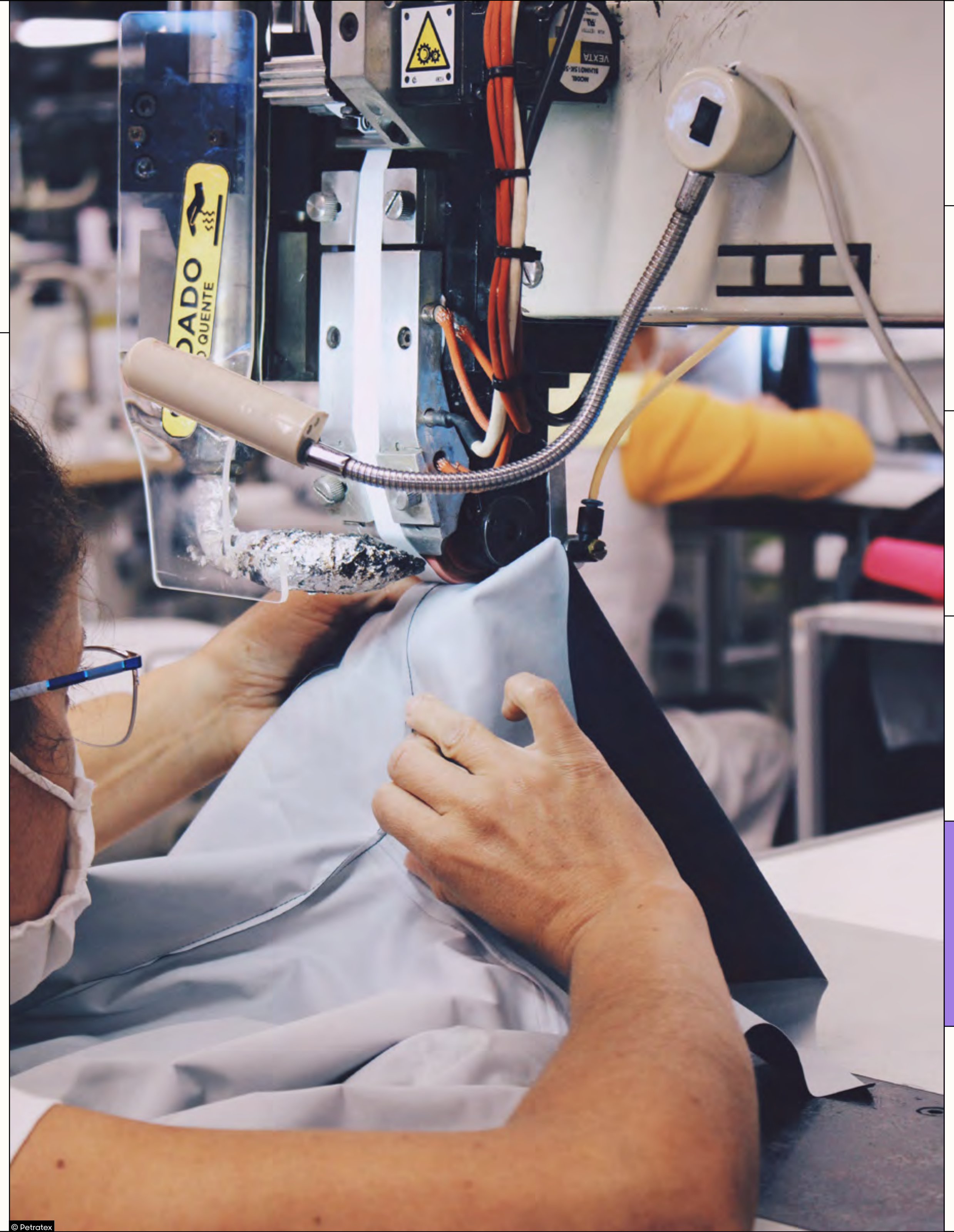


Being able to raise concerns or issues is crucial to remediate any grievances. Grievance mechanisms are procedures that provide a clear and transparent framework for addressing employee concerns in the workplace. These mechanisms, such as suggestion boxes or grievance hotlines, are reviewed during our partner facilities' audits to ensure that functional measures are in place.

Where grievance mechanisms are insufficient or not trusted, brands can provide external channels for factory workers to contact and, through our membership with Fair Wear Foundation, we intend to roll out their trusted process. We also have internal channels for PANGAIA employees to raise such grievances as detailed in our Employee Handbook.

Ways for workers to have a voice

- Join a union.
- Elect a worker committee or a worker representative.
- Have a trusted grievance channel to raise and remediate concerns.
- Feedback through surveys and engagement to management.
- Take part in a collective bargaining agreement process.



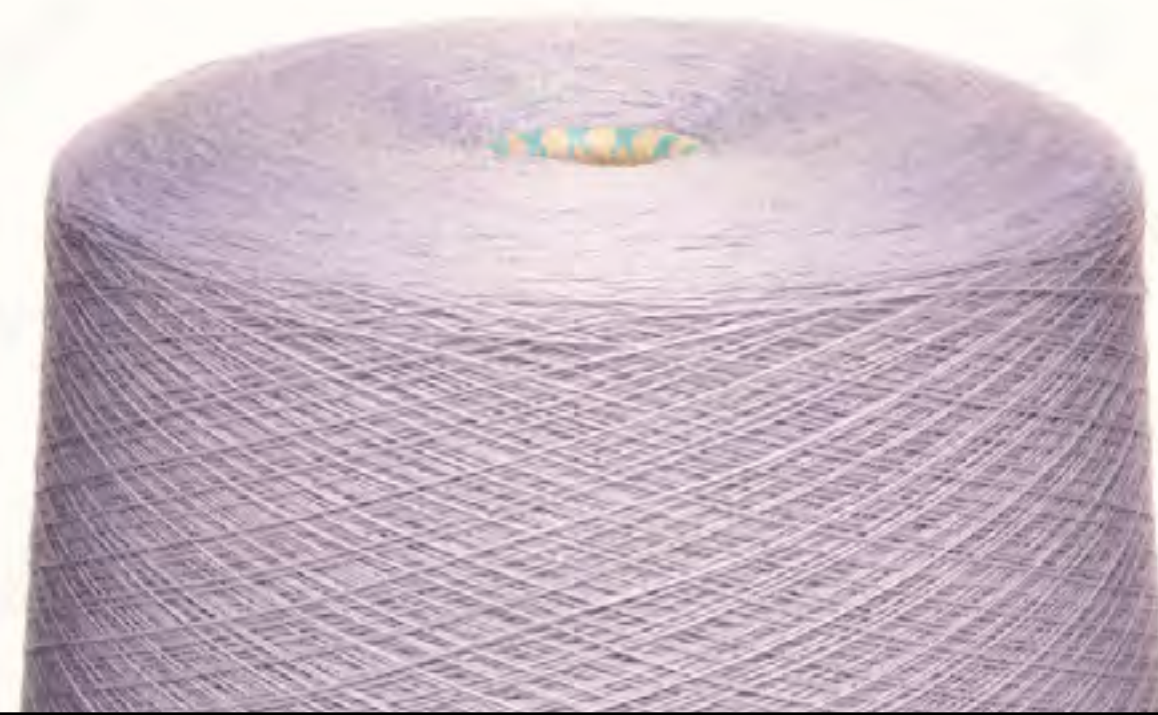
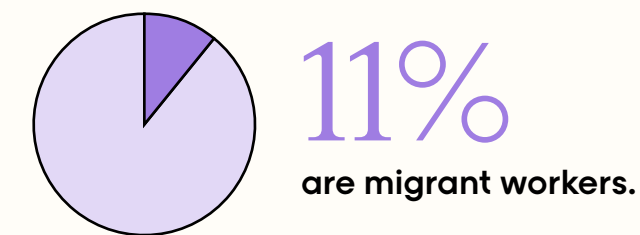
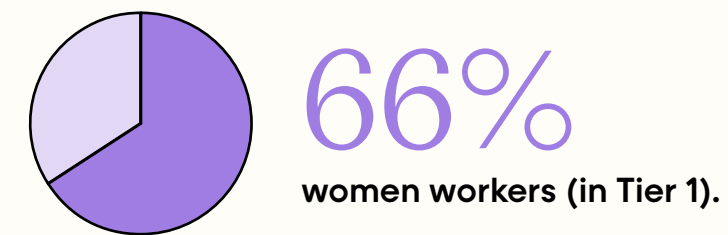
Advocating for equity, diversity and inclusion to foster empowerment

We know that when workers are empowered, workplaces become more productive and businesses more profitable; however advancing diversity, equity and inclusion is a long journey.

Recognizing the critical role that suppliers have in tackling the barriers faced by women in supply chains, we have chosen to specifically focus on gender equity.

We're supporting our suppliers in being more inclusive by reducing bias and creating safe and supportive workplaces. Increasing the representation of women in management and supervisory positions across supply chains can help to address power imbalances and build safe and inclusive working environments.

In 2022, PANGAIA signed the [UN Women's Empowerment Principles](#) to affirm our commitment to gender equality and help structure our program of work. The seven principles guide companies in mainstreaming gender through the workplace, community and marketplace. We intend to assess the status of gender balance and the treatment of women in our finished goods manufacturing (Tier 1).



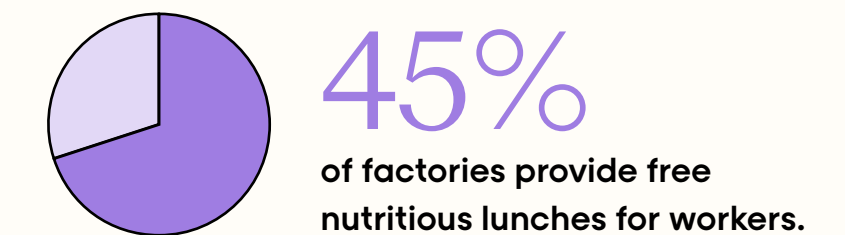
Enabling health & safety and promoting wellbeing

Enabling better health and safety is an ongoing journey to improvement, and it is our most frequently cited non-compliance found in audits and on supplier visits.

Some of the most common issues include; lack of personal protective equipment, inadequate chemical storage, minor fire safety non-compliances as well as lack of occupational health check-ups.

We know that there are good practices across our supply chain that go above and beyond to make their workplace a good place to be. Initiatives that our factories undertake include providing meals, transport, bonuses and support with the cost of living, as well as community giving back projects and charity work.

We work with our suppliers to improve health & safety practices and aim to support our factories to adopt policies and programs that have a positive impact on worker wellbeing.



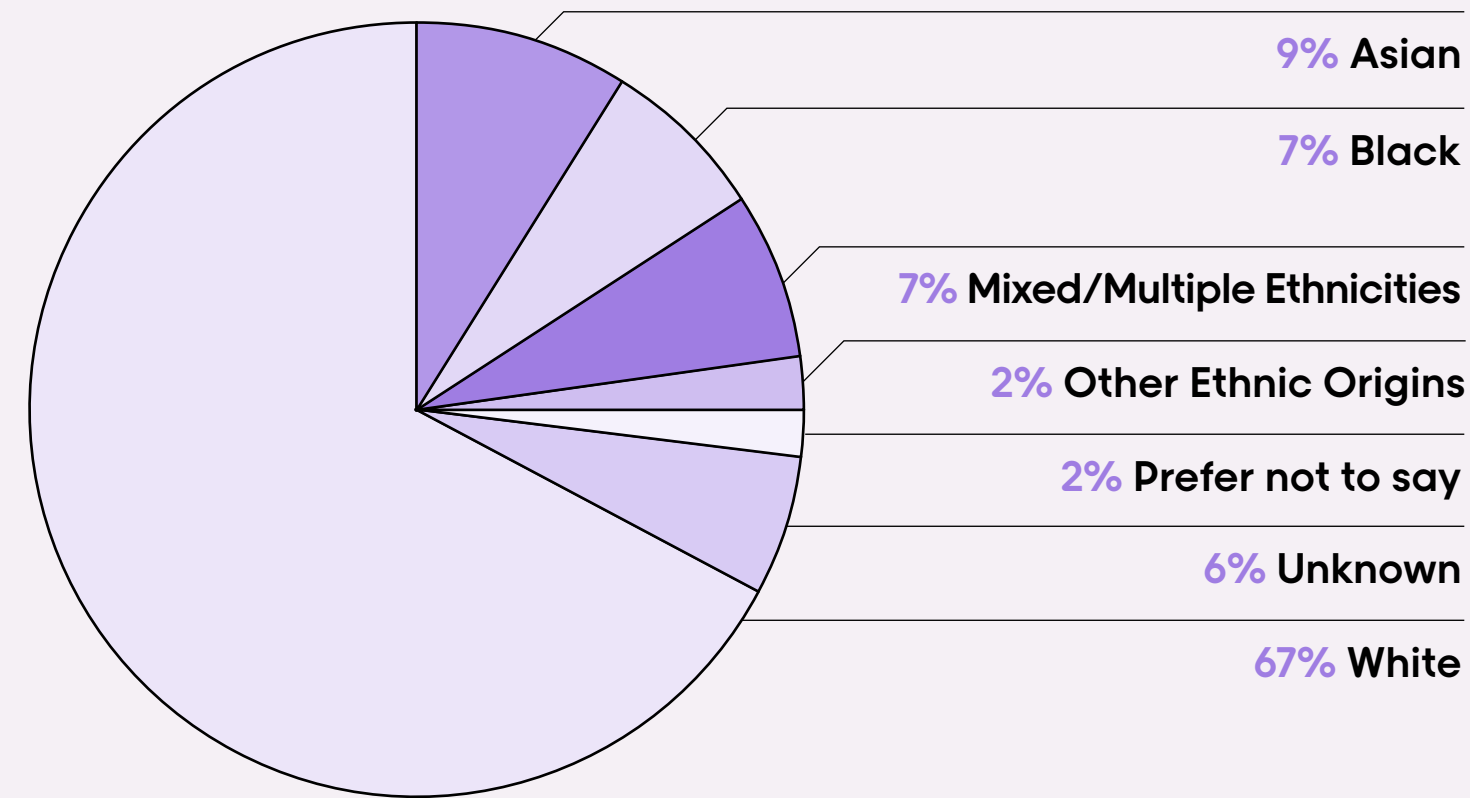


Our employees: the people of PANGAIA

At PANGAIA, we are a global collective of individuals bound by a common desire to use business as a force for good. PANGAIA is headquartered in London, with colleagues in Italy, France, the USA and Switzerland.

We are reflecting on our practices and ways to welcome a more diverse team, build a more inclusive culture, improve the employee experience and continue to facilitate a supportive environment where people are encouraged to reach their full potential. We appreciate that we can do better and look forward to sharing our updates with you.

Ethnicity



This data was collected as part of a self-identification voluntary survey.

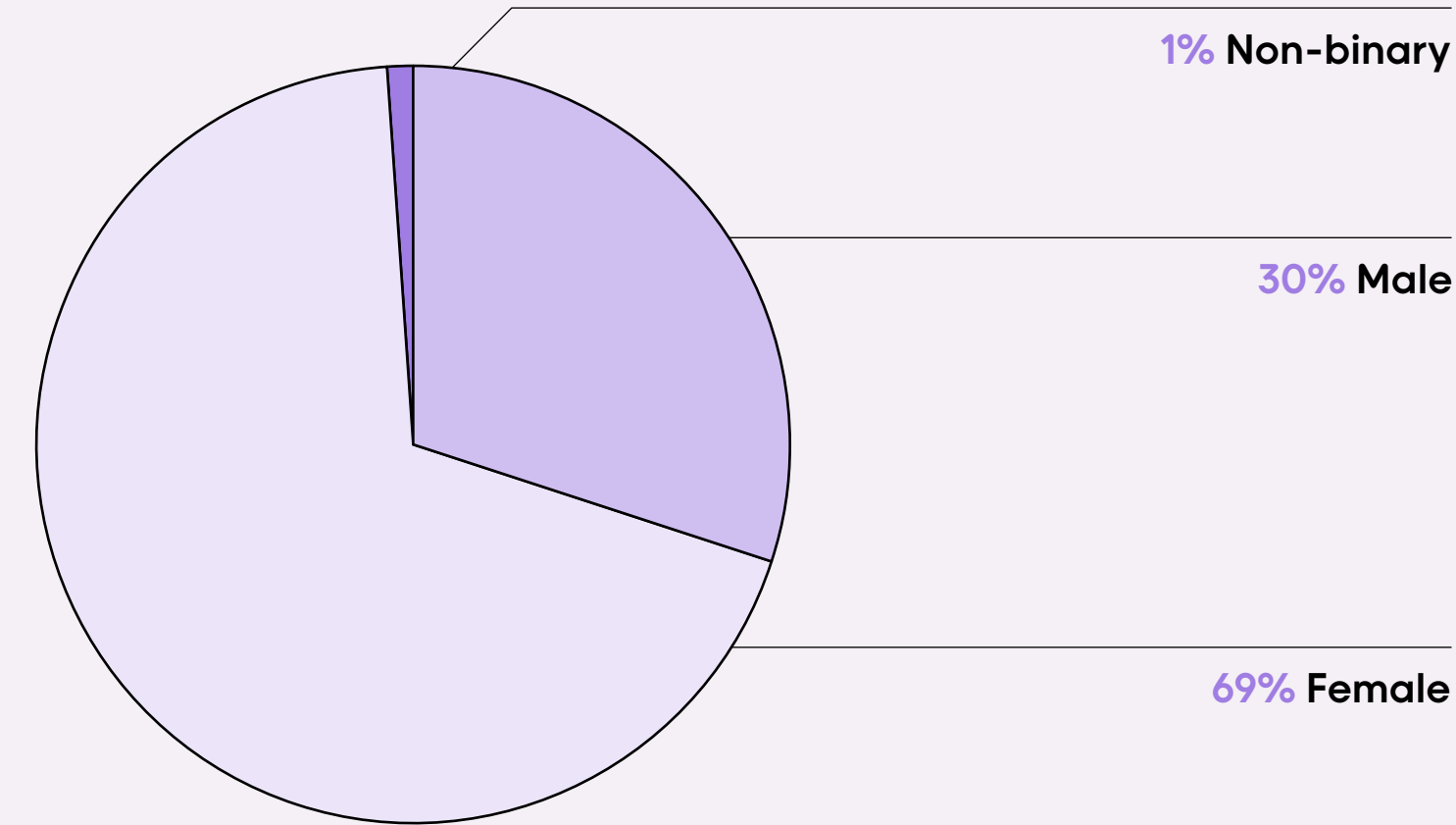
24%

of our Senior Leadership team (Directors & Exec) are from an ethnic minority background.

22%

of our managers in the business are from an ethnic minority background.

Gender identity



Our Senior Leadership team is gender balanced.

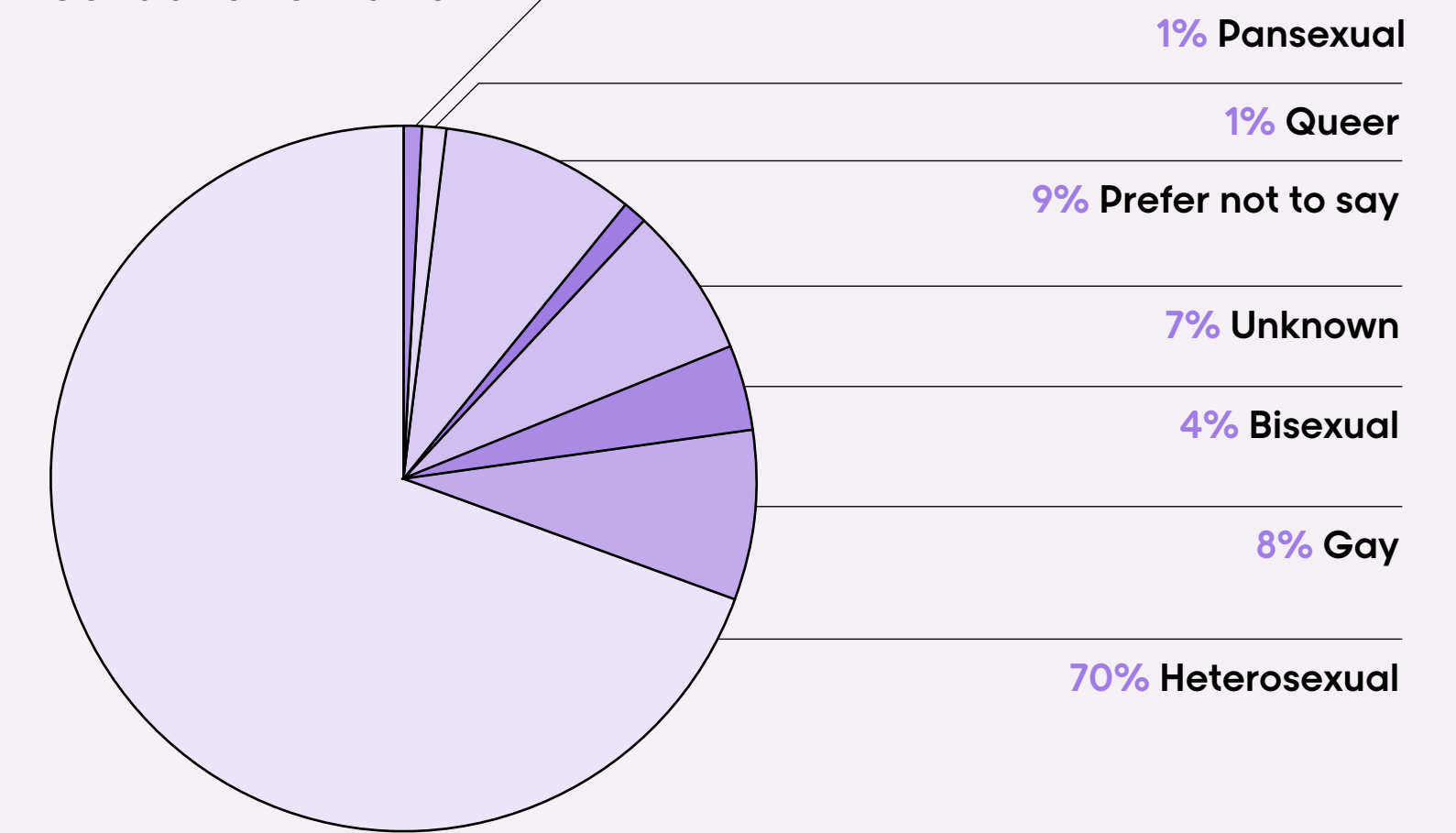
50%

of our senior leadership team identify as female.

38%

of PANGAIA employees observe and celebrate a religion or belief. These include; Buddhism, Christianity, Hinduism, Humanist, Islam and Judaism.

Sexual orientation



16% of our Managers identify as from the LGBTQ+ community.

>30

languages are spoken by our team.

3%

of our employees have a declared disability.



Our policies

In 2022 we implemented our first-ever Employee Handbook designed to give our teams information about what to expect during their employment with PANGAIA.

Equal Opportunities	Underlining our commitment to being a business in which equal opportunity is a reality and in which every individual can seek, obtain and enjoy employment without discrimination.
Anti-Bullying and Harassment	Reiterating our commitment to providing a working environment free from bullying and harassment and ensuring that our team members are treated with dignity and respect.
Whistleblowing and Anti-bribery	Outlining our commitment to conducting all business in an honest and ethical manner.
Grievance Procedure	Defining the procedures we have in place to ensure that all colleagues can clearly raise a complaint or grievance in a respectful and trusted manner.
Sickness	Our approach to paid short term and long term sickness absence for our teams, including mental health illnesses.
Flexibility	For our office-based teams, we have a flexible, 'hybrid' approach to working. If one of our UK team members wish to observe a religious or cultural holiday that does not coincide with the UK's bank holidays, they can choose to work on one of the UK's bank holidays and take this day in lieu.
Family	<p>The implementation of new policy and benefits designed to support team members who are planning or starting a family, whether through pregnancy, adoption, fostering or returning from leave related to this. This includes:</p> <ul style="list-style-type: none"> • Time off for appointments related to family planning, including (but not limited to) IVF, adoption, fostering, surrogacy and pregnancy related appointments. • Paid bereavement leave after experiencing a miscarriage before 24 weeks pregnancy (extending the existing entitlement to leave after 24 weeks). • Paid compassionate leave if a baby is born prematurely and paid time off to attend medical appointments within the baby's first year. • Enhanced maternity, adoption, paternity and shared parental leave pay. • After time away, team members will be supported in returning to work through a re-introduction to the business and being able to work 80% of their usual hours whilst continuing to receive full pay in the first month of work.

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Our internal People systems

In 2022 we implemented a new global HR Information system to support our operations. This system supports areas such as onboarding and performance management and obtaining team feedback. It also enables us to better report confidentially on our diversity efforts.

Advancing fair pay

We identified our compensation and reward philosophy and carried out benchmarking to stay true to this.

We implemented bi-annual salary review processes that allow us to review regularly and ensure fair pay practices. We are very proud to have committed to becoming a living wage employer and in 2022 we received accreditation from the Living Wage Foundation in the UK.

As we expand our global footprint, we endeavor to continue this commitment.

Amplifying voices

By utilizing our new HR system, we were able to put the foundations in place to be able to continuously listen to feedback from our teams. We have identified key milestones during onboarding and offboarding as opportunities to seek feedback on our team members' experiences at PANGAIA and what we can do to improve. We also conducted a workplace experience survey to understand how we can make the working environment a productive and collaborative space.

In 2022 we welcomed a new CEO who hosted 'listening sessions' with our team members and implemented a monthly Town Hall hosted by our executive team.

At the end of 2022, we launched PANGAIA Communities which encourages team members to set up employee resource groups that provide support to each other and feedback to the business on how to support this community. Our first-ever community for parents and carers was launched and we hope to have more in 2023.

Engaging our teams in creating personal impact:

- **Meat-free Mondays** were introduced twice a month, paid for by the company to encourage team members to be conscious of their impact on the environment.
- **Volunteering** time off was introduced, consisting of 2 paid days off per year for colleagues to donate their time and skills to the charity of their choice.

In 2022, 88 hours were taken by our teams to participate in volunteering activities. We recognize this as an opportunity for us to instill this policy in our culture further and we speak to our future plans below.

- **Raised awareness** of underrepresented communities through social activities including, Black History Month, Stress Awareness month and Pride.

Wellbeing

We have implemented paid leave policies that allow our team members to take time off for short and long-term sickness, bereavement, compassionate reasons, maternity, paternity and adoption leave. We continue to provide health, dental and vision benefits for our employees where possible. We promote and facilitate cycling to work and offer gym membership discounts.

To support mental health and wellbeing we offer an employee assistance program through our partner LifeWorks and additional counseling support through StrongerMinds.

We have also implemented learning opportunities that include developing strategies for maintaining wellbeing and training for managers on how to support team members with their wellbeing.

Learning and development

In 2022, we established three main focus areas of learning and development to enhance our culture and drive our performance:

- 1) **What we value:** impact, inclusion and innovation.
- 2) **Ethics and compliance:** modern slavery, data protection, discrimination.
- 3) **'365' skills that make you successful at PANGAIA:** wellbeing and resilience, feedback and some other management training 'manager toolkits'.

Our team completed 1000 hours of training, of which 400 hours were management development sessions focusing on everything from wellbeing, DEI, innovative thinking, feedback and recruitment.

To develop these skills with our non-management teams we also provided individual learning across topics including dealing with uncertainty, learning from failure, developing resilience and managing stress. To support the development of an inclusive culture we held training on developing listening skills and understanding bias.

To enhance internal understanding and engagement of our purpose, our impact and R&D teams held learning sessions on topics including; the impact of materials, circularity, carbon emissions, and modern slavery. We are so proud of the talent within PANGAIA that in addition to learning opportunities, 18% of our team members received a promotion in 2022.

Our giving-back initiatives

In 2022, our giving-back initiatives focused on humanitarian relief, supporting climate justice and equity. In 2022 we donated over \$105,000 to human-centered charities in addition to our environmental funds (see more in the [Planet](#) section).



Humanitarian relief

Whenever possible, we aim to respond to global emergencies by working with NGOs that provide emergency aid and relief on the ground. In light of the ongoing conflict in Ukraine, we donated to Direct Relief, Save the Children and Choose Love. The latter is a long-term partner of PANGAIA and we are in awe of the incredible work Choose Love delivers from lifesaving rescue boats to food and legal advice.



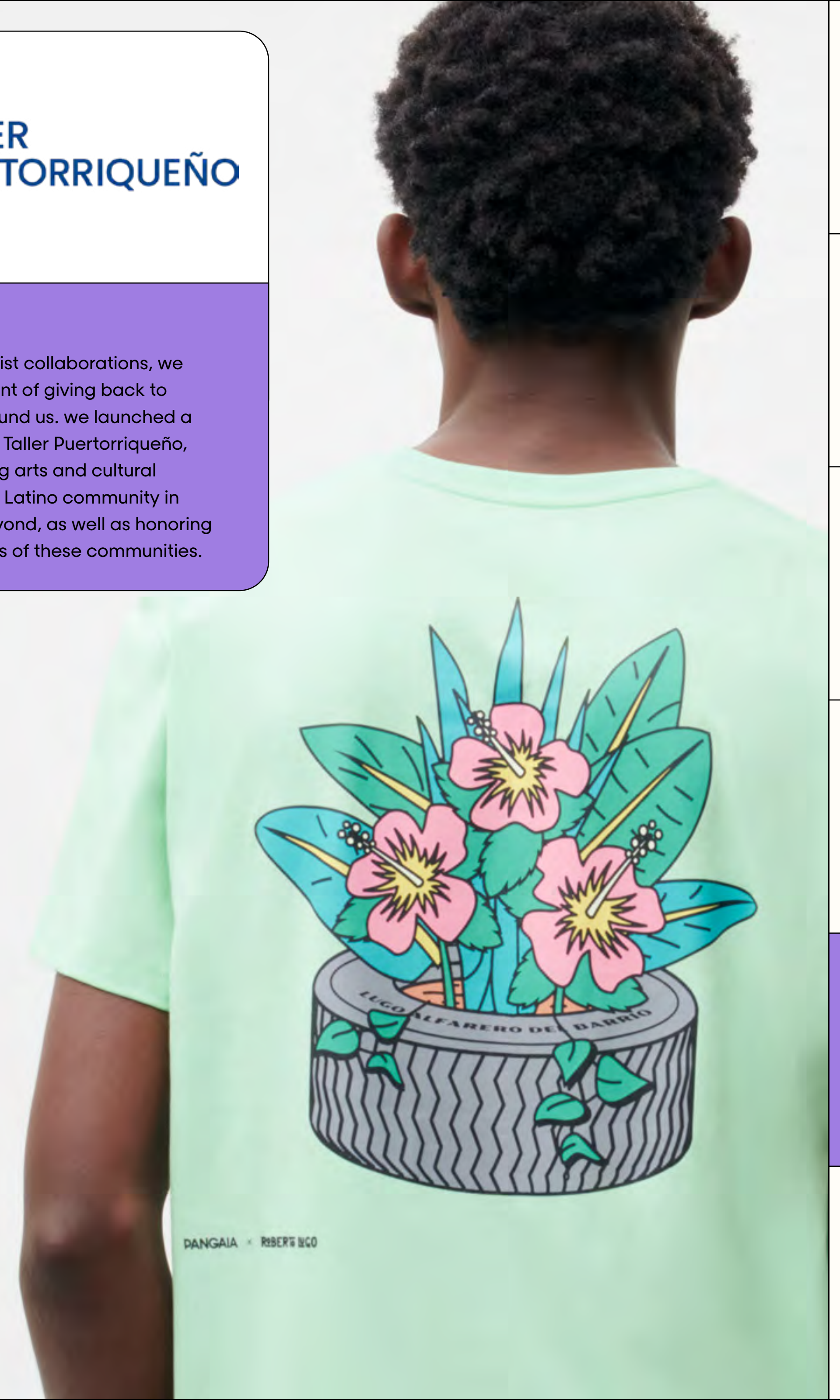
Climate justice

Some of Earth's most biodiverse islands are under threat. Fiji, Seychelles, Solomon Islands, Palau and more of the Small Island Developing States and Member Island Territories (SIDS) are some of the most vulnerable to the effects of extreme weather and climate change. In light of the 2022 Hunga Tonga-Hunga Ha'apai volcanic eruption, part of the proceeds from our small island capsule was donated to Red Cross New Zealand to support the people of Tonga and the affected surrounding Pacific islands.



Equity

Through all of our artist collaborations, we aim to add an element of giving back to the communities around us. We launched a collection to support Taller Puertorriqueño, a non-profit providing arts and cultural programming for the Latino community in Philadelphia and beyond, as well as honoring the accomplishments of these communities.



Takeaways

- ✓ Furthered our social governance across the supply chain and established **new ethical policies** for our partners.
- ✓ We mapped our **Tier 1 subcontractors** and our **Tier 2 suppliers**.
- ✓ 95% of our 'Tier 1 factories' have a **third party social audit** verifying working conditions.
- ✓ 85% of workers in our factories are covered by **collective bargaining agreements**.
- ✓ We donated **\$105,000** to social philanthropic causes.
- ✓ Significant progress made in putting in place strong foundations for internal and external **governance**, ensuring **fair pay** and **living wages** within our operations.
- ✓ Investment in the development of our **People strategy** to promote an inclusive culture through enhanced policies and benefits, learning & development and employee communities.

Actions for 2023

- We will be broadening and deepening our visibility into our supply chain by mapping and understanding the practices of our **material suppliers**, and **publishing a list of our mills** as part of this work.
- To show our commitment to responsible purchasing practices, we will draft a new **policy outlining our business conduct principles**.
- We commit to developing a **raw material due diligence process** to help guide our support for human rights at the early stages of the supply chain and roll out in 2023.
- In 2023 we will create collaborative action plans with our key suppliers across our four positively impacting lives pillars and support them with **education and resources**.
- We intend to connect our **giving back** efforts more closely to the communities impacted by our business footprint, and where possible we will respond to needs in our sourcing countries.
- We'll be implementing new **financial wellbeing initiatives** for our employees, managers and business.
- We are extending our commitment as an accredited **UK Living Wage Employer** to become a **Living Hours Employer** by the end of 2023.
- We intend to conduct an assessment of how our business supports the **UN Women's Empowerment Principles** and create a roadmap of improvements, including conducting a **gender pay review**.
- We will launch our **2023 employee survey** to benchmark our employee engagement.



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Partnerships as the pathway to our Earth-positive future

Our commitment to building an Earth-positive business began more than 3 years ago. This report has shown we have made progress; however, we know this is only the beginning and there is a long way to go. We see our journey as a continuous learning and improvement opportunity.

We know that we cannot enact change alone, so we have collaborated with a number of industry partners and voluntary initiatives to promote responsible practices, hold ourselves to account and learn from industry experts. We like to think of these as a 'web' of partners - helping us to build and strengthen the foundation of a more responsible industry that promotes collaboration.

Accelerating our impact through industry transformation

Beyond using innovative materials within our own designs, we want to see these solutions scale across the industry through our B2B arm that provides a 360-degree service of turn-key material and impact solutions. 2022 was our most successful year from a B2B perspective to date - working with established industry organizations whilst also further expanding our reach into adjacent industries.

We invite all brands, institutions, academics, innovators, and educators to talk to us about and join us (b2b@thepangaia.com) in amplifying and scaling solutions. We are at our most potent when we work together, combining our innovation, creativity and imagination to design a better future for the world we share.

Pangaia B2B: 2022 in numbers

25

Partners we've worked with

2,200

Meters of material sold

40,000

Garments sold

15

Innovations or technologies shared

75,000

People reached through the ripple effect of our partners

Luxury
Fashion
Apparel
Footwear
Investment
Insurance
Entertainment
Food

Industries

France
Italy
UK
US
Belgium
Spain
Switzerland
The Middle East

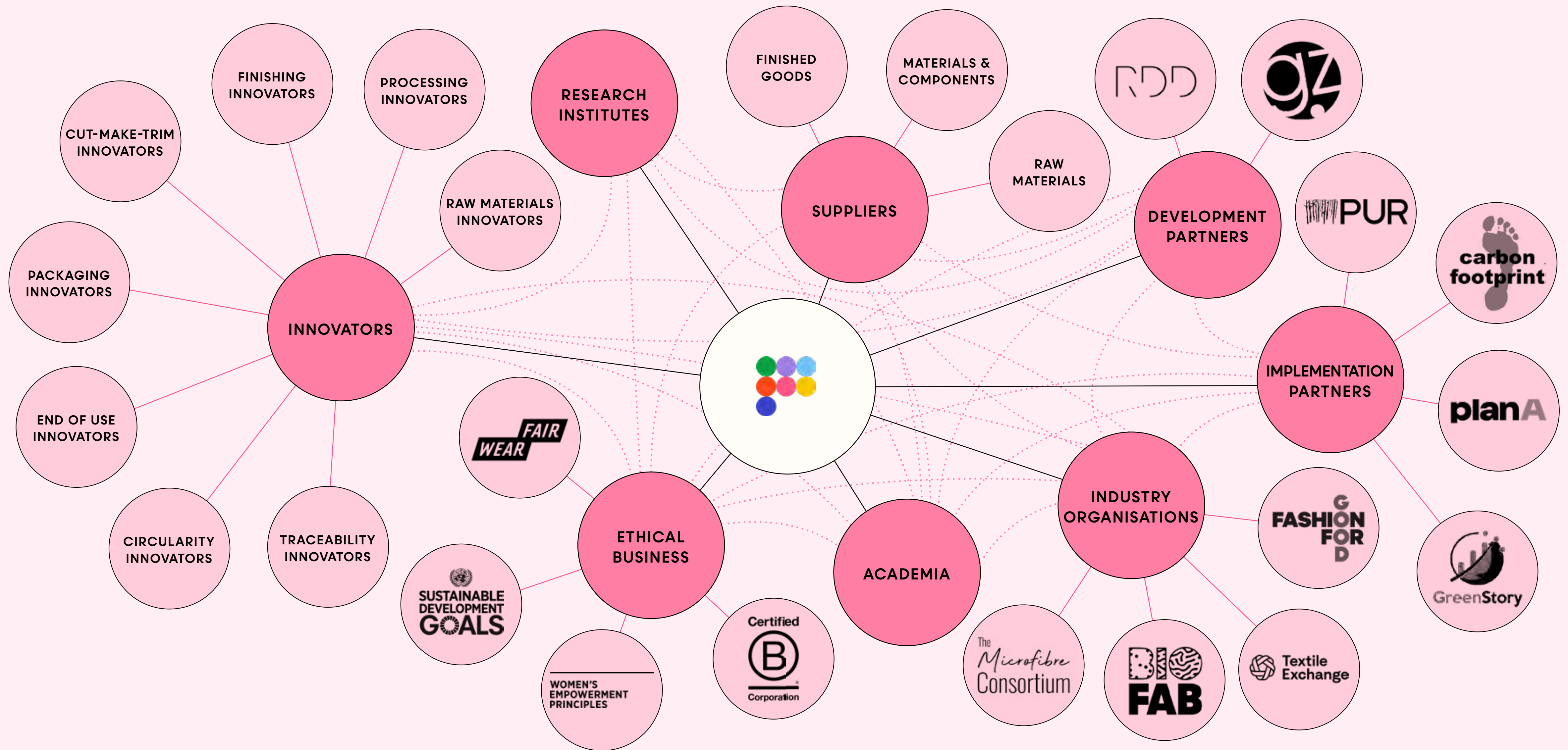
Countries

“Merchandise with a positive impact. We are collaborating with PANGAIA to produce merchandise that puts our planet first”

2022 B2B client



The web of partners that make PANGAIA possible





APPENDIX

How we use data

Our carbon footprint

We strive to use the best available, credible and substantiated data. While we seek primary data, this is not always possible due to access. We have partnered with [Plan A](#), using their carbon accounting software to assist with our data input and to determine our carbon footprint. We consolidate and input our data in bulk into the software and the system provides the relevant emission factors and national averages to fill in any existing data gaps.

Using the integrated carbon calculator within the Plan A platform, we are able to measure our scope 1, 2 and 3 emissions in compliance with the Greenhouse Gas Protocol. Our 2022 footprint was determined through the following categories:

- **Energy** (Electricity and Heating)
- **Business Travel**
- **Employee Commuting** (including working from home)
- **Suppliers** (Purchased Goods & Services)
- **Transportation** (Upstream and Downstream Transportation and Distribution)
- **Waste**
- **Sold products** (Use phase and End-of Life)
- **Other** (Materials and Concessions)

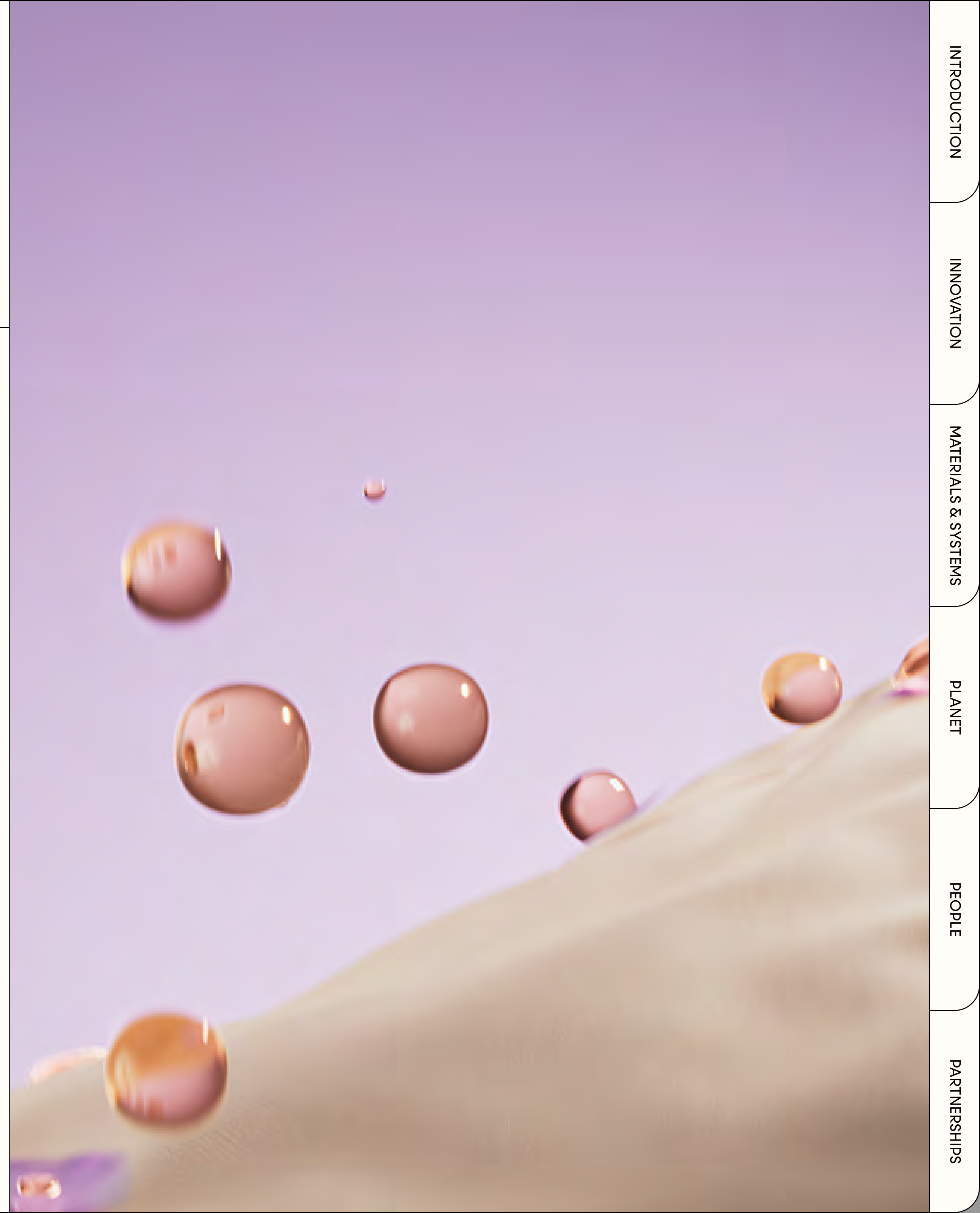
Our data has not been independently verified but our methodology has been approved by Plan A whose carbon accounting methodology is certified by [TÜV Rheinland](#).

We remain committed to continuously improving our data quality and continue to provide environmental and social context to aid the interpretation of categories in our reporting.

Additional partners

[Carbon Footprint](#) helps us calculate the associated GHG emissions of our retail events.

[Green Story](#) is a platform that works with PANGAIA to unlock the potential of supply chain data. PANGAIA has partnered with GreenStory on our Life Cycle Assessment program and utilizes their methodology. Green Story enables PANGAIA to quantify and show the environmental performance of their products, through Life Cycle Assessment analysis.





Our Life Cycle Assessments (LCAs)

Our LCAs are calculated using the CML 2001 methodology.

The CML 2001 primarily focuses on the environmental impacts associated with specific material production. As part of this assessment we aim to include all the unit processes, all the raw material inputs (if there are several inputs for one material, all of these are modeled and represented in the final LCA), alongside measuring other inputs such as; water, energy, packaging and outputs; predominantly emissions and waste.

For all of our materials, a cradle-to-gate approach (from raw material to our distribution center) is used to evaluate environmental performance of materials. The boundaries of the studied system depend on the level of data collection we can gather per material.

We have two main data sources; primary and secondary sources. Primary data is directly disclosed from our supply chain and we work with our supply chain partners to gather material relevant data so we can model material impact accurately.

Secondary sources are still incredibly valuable, if we have an indication of production inputs, process and location. If we are not able to get to the specific raw material information, we use aggregate datasets from GABI to model our impacts on a regional, country or sometimes even global level. If we cannot source enough information to inform secondary data modeling, this stage will be eliminated from the scope of the LCA calculation.

The functional unit for our material assessments is set as the production of 1 kg of garments. This reference unit is used as the basis for the calculation of the environmental impacts of the studied system.

This means that all the parameters (material and energy consumption) used in our LCAs refer to the production of this amount of material.

Critically, our LCAs only examine a specific apparel supply chain and production processes for a PANGAIA material. The LCA insights cannot be used for any other generalized processes or products. We do not compare impacts for materials outside of consistent textile classifications. i.e. we do not compare cotton to nylon.

All of the reduction claims seen on site in accompanying widgets are calculated using comparative benchmarks. i.e. conventional cotton to organic cotton. These will be against industry available datasets from indexes such as Ecolinvent or GABI.

We use the LCA results to inform our strategic direction and reduction target setting. Whilst we are on the journey of implementing low impact solutions, we also use the data to offset the products carbon footprint by purchasing credits. We know this isn't the end solution (more a solution of last resort), but we've chosen to offset and set reduction targets simultaneously to make use of imperfect solutions available today, and plan in better solutions over time.

Primary data sources

- Life Cycle Inventory Data (supply chain partner disclosure)
- Logistics providers emission reports
- Expense forms and invoices to tag associated carbon emissions with activity
- Carbon surveys

Secondary data sources

- Global Life Cycle Inventory Databases i.e. Ecolinvent and GaBi
- Peer reviewed academic research and journals

Our LCAs measure 13 impact categories:

Abiotic Depletion measured Abiotic Depletion (ADP) as two metrics ADP elements & ADP fossil, respectively	Refers to the depletion of non-living (abiotic) resources such as fossil fuels, minerals, clay, and peat.
Eutrophication	Eutrophication sets off a chain reaction in the ecosystem, starting with an overabundance of algae in freshwater systems/oceans. Algae bloom and many aquatic species like fish disappear due to excessive phosphorus concentration.
Acidification	Acidification of water and soils occur through the transformation of air pollutants into acids. This lowers the pH of seawater, a process known as ocean acidification.
Blue Water Consumption	Blue water consumption models water that has been sourced from surface or groundwater resources and is either evaporated, incorporated into a product or taken from one body of water and returned to another, or returned at a different time. This applied to irrigated agriculture, industry production and domestic water use. The amount of water abstracted from the sources, that does not return to the catchment from where it was withdrawn.
Freshwater & Marine Aquatic Ecotoxicity	This category indicator refers to the impact on freshwater ecosystems (potentially affected aquatic species), as a result of emissions of toxic substances.
Global Warming Potential measured as two separate metrics, with and without biogenic carbon	GWP is the measure of the amount of energy the emissions of 1 ton of a greenhouse house gas will absorb over a given period of time, relative to the emissions of 1 ton of carbon dioxide (CO ₂). Biogenic carbon emissions are those that originate from biological sources such as plants, trees, and soil. Biogenic carbon emissions relate to the natural carbon cycle and there is significant interest in quantifying how plants capture CO ₂ in the process of photosynthesis, how it is lost in respiration and stored in biomass (both living and dead), and finally biologically sequestered into long-term biological stores in the soil. Exclusion of quantification of this sequestered carbon in a products life cycle, is termed as excluded biogenic carbon.
Human Toxicity	Reflects the potential harm of a unit of chemical released into the environment on human health.
Ozone Layer depletion	Release of chemical compounds containing chlorine or bromine gasses from industries/human activities affect the ozone layer. Effect on human health (years of life lost/disabled) related to increased skin cancer and cataract due to UV-exposure.
Photochemical ozone creation	Photochemical Ozone Creation Potential (POCP) is the potential of ozone creation at ground level (i.e. tropospheric ozone) through photochemical transformation of ozone precursor emissions. The main ozone precursor compounds are nitrogen oxides (NOx) and non-methane volatile organic compounds (NMVOC).
Terrestrial Ecotoxicity	Terrestrial ecotoxicology is the study of how environmental pollutants affect land-dependent organisms and their environment.
Primary Energy Demand from renewable and non renewable resources	Primary energy demand is the quantity of energy directly withdrawn from the hydrosphere, atmosphere or geosphere or energy source without any anthropogenic change.

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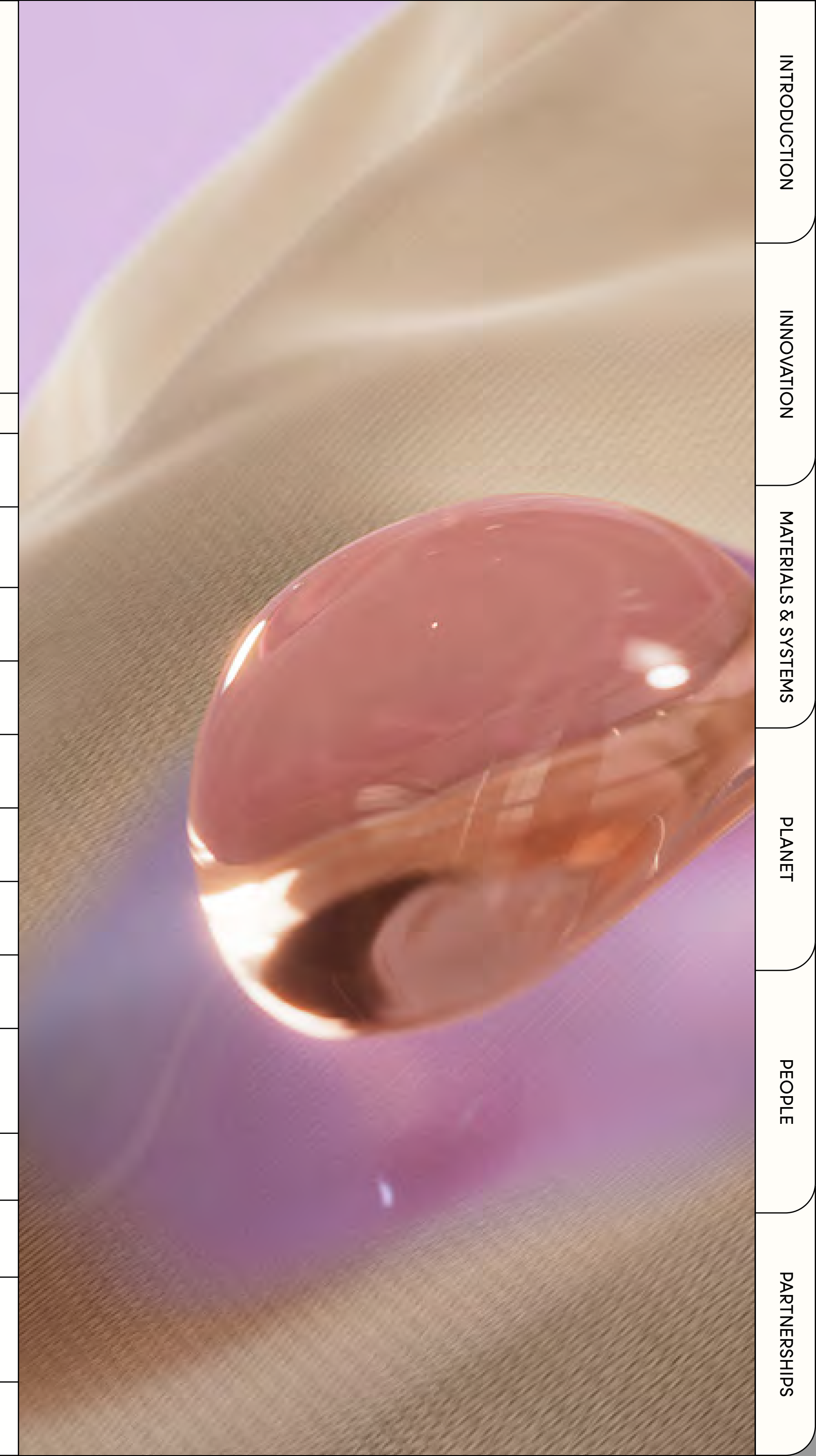
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Impact x innovation material highlights 2022

INNOVATION	DESCRIPTION	R&D PILLAR
Activewear 2.0	Bio-based nylon with enhanced degradation elastane.	Fossil fuel free
PANGAIA LAB Infinited Fiber T-shirt	The world's first t-shirt made from 100% post-consumer cotton-rich textile waste, recycled with a responsible chemistry compared to standard viscose.	Waste reduction
Reclaim	Products made with a fabric that is blend of our production scraps mixed with organic cotton.	Waste reduction
PANHemp™ Denim	A new colour edition of hemp denim which is made from rain-fed hemp that is 4 times stronger than cotton.	Biodiversity
PANettle™ Black	A new black edition of our denim made with wild Himalayan nettle.	Biodiversity
Reclaim 2.0	Products made with a fabric that is blend of our production scraps mixed with organic cotton.	Waste reduction
Spiber™	NXT GEN Hoodie, first hoodie using Brewed Protein™ that can replace animal protein fibers.	Cruelty-free
Renewcell Circulose	Knits made with a fiber created from post-industrial textiles and blended with FSC-certified wood.	Waste reduction
Recycrom	We use pulverized textile scraps from PANGAIA's production as a mechanism for dyeing new textiles. This colored powder dyestuffs are made from 98% textile waste from PANGAIA's production scraps and leftovers.	Waste reduction
Activewear 3.0	Bio-based nylon and the first launch of a partly bio-based elastane.	Fossil fuel free
Food Dyes Capsule	Product using a fabric that is dyed with food waste from sources such as: matcha, rooibos, blueberry.	Water health
Dropel	A part bio-based polymer that is applied as a durable water repellent finish. It is compatible with natural fibers. The coating technology is certified to be free of per-fluorocarbons, nanoparticles or harmful toxins. The manufacturing process for the coating is Bluesign® certified.	Water health
FLWRDWN™	Our proprietary bio-based down alternative, now with an 83% increase in fill power.	Cruelty-free



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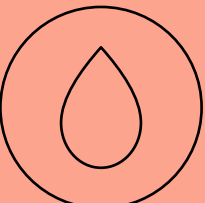
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Regenerative Outcome Framework

CATEGORY	KPI	MEASURE UNIT	FREQUENCY
 Performance	Yield	kg/ha	Annual
	Area positively impacted	ha	Annual
	# regenerative practices implemented	#	Annual
	# of trainings delivered	#	Annual
 Soil	Soil organic carbon (15cm)	%	Baseline + year 3
	Bulk density	g/cm ³	Baseline + year 3
	Soil texture	classification	Baseline
	Aggregate stability	Slake test	Annual
	Water infiltration	Infiltration rate (in/min)	Baseline + annual
	Soil macronutrients	g/kg	Annual
 Carbon	CO ₂ e emissions	Ha or crop basis	Annual
 Biodiversity	Biodiversity elements on farm	ha	Annual
	Flora species richness (targeted areas of farm - pollinator strips)	# species	Annual
	Synthetic inputs applied	L or kg	Annual
 Water	Reduction in water use	L or m ³	Annual



Preferred Materials List (PML)

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	● DROP OUTS	● LAGGARDS	● MIDDLE OF THE PACK	● RUNNER UPS	● CHAMPIONS
Natural cellulosics	<ul style="list-style-type: none"> Conventional cotton Better Cotton Initiative (BCI) 	<ul style="list-style-type: none"> In transition organic cotton 	<ul style="list-style-type: none"> Organic cotton Mechanical recycled cotton <50% Conventional nettle Conventional linen Conventional hemp Conventional kapok 	<ul style="list-style-type: none"> In transition regenerative organic cotton Cotton sourced from an in transition regenerative system Mechanically recycled cotton >50% 	<ul style="list-style-type: none"> Regenerative organic cotton Cotton sourced from a regenerative system <small>*And outcomes measured within PANGAIA's regenerative outcome measurement framework</small> Organic linen Organic hemp Organic kapok
Natural protein	<ul style="list-style-type: none"> Conventional silk Conventional wool Conventional cashmere Animal fur Animal leather Recycled leather 	<ul style="list-style-type: none"> Pre-consumer recycled cashmere <80% RWS wool <50% Recycled wool < 50% 	<ul style="list-style-type: none"> Recycled cashmere >50% RWS wool 	<ul style="list-style-type: none"> Pre-consumer recycled cashmere 100% Recycled wool >50% Nativa merino Spiber™ <small>*this is a brewed protein fiber</small> 	<ul style="list-style-type: none"> Post-consumer recycled cashmere 100% Nativa Regenerative Merino
Man made, natural polymer, cellulosic (aka MMCF)	<ul style="list-style-type: none"> Viscose Rayon Modal Cupro 		<ul style="list-style-type: none"> C-FIBER™ PLNTFIBER™ FRUTFIBER™ Bamboo Lyocell Lyocell SeaCell VEGEA™ Circulose® (Renewcell) <30% 	<ul style="list-style-type: none"> INFINNA™ (Infinite Fiber Company) >100% Nucycl™ 30% (Evrnu) Circulose® (Renewcell) >30% 	<ul style="list-style-type: none"> Nucycl 100% (Evrnu) INFINNA™ (Infinite Fiber Company) 100%
Man made, synthetic polymer, biosynthetic			<ul style="list-style-type: none"> 100% Bio-based PLA >30% Bio-based elastane 	<ul style="list-style-type: none"> 100% Bio-based nylon 70%- 100% Bio-based elastane 	<ul style="list-style-type: none"> KINTRA FLWRDWN™ 100% Bio-based & biodegradable nylon <small>*This doesn't exist, yet!</small> 100% Bio-based & biodegradable elastane <small>*This doesn't exist, yet!</small>
Man made, synthetic polymer, petro chemical	<ul style="list-style-type: none"> Conventional polyester Conventional elastane Conventional nylon Polyurethane Polyethylene PVC 	<ul style="list-style-type: none"> Pre-consumer mechanically recycled Polyester (rPET) <small>*Accessories only</small> Pre-consumer chemically rPET <small>*Accessories only</small> Recycled elastane <50% 	<ul style="list-style-type: none"> Pre-consumer mechanically recycled nylon Pre-consumer chemically recycled nylon Post-consumer rPET (mechanically or chemically recycled) ROICA™ V550 	<ul style="list-style-type: none"> Post-consumer mechanically recycled nylon Recycled elastane >50% 	<ul style="list-style-type: none"> Recycled elastane 50% - 100%



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