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Apparel Insider 50

THE GLOBAL STARS OF SUSTAINABLE TEXTILES

Apparel Insider

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We are often told the global fashion industry is the second most polluting on earth. Various people have disputed this 'fact' over the years, and this is certainly a claim we would not repeat. We are not sure anybody really knows the precise extent of the damage caused by fashion and its various supply chains. One thing we can all agree on, however, is that this damage is huge, it is likely to get worse unless our industry changes direction, and most of it occurs in supply chains.

"We didn't expect this pandemic to go on for quite so long and wreak so much havoc but here we are in July in what has been the strangest few months for all concerned"

We had this final thought in mind when compiling this, a list of people and their businesses who are doing interesting things in the world of sustainable textiles. The world of fashion and apparel needs innovative new ideas like never before. It also needs them to be scaled, and one of the interesting things we found when compiling this list was that many of the 'stars' we focused on was working with a business that had developed a great idea but had not yet scaled it.

That's not a critique, more to make a point that one of the most telling factors about innovation in the sustainable textiles space is that there are a huge amount of amazing ideas about but funding these beyond pilot and other early stage development is where the real work begins. In that sense, it will be a worthwhile exercise to revisit some of the names in this brochure and see where their technologies or ideas are in three to four years' time. It will also be interesting to see what impact the coronavirus pandemic has on new innovations in sustainability; things really could go either way on that front.

The ideas contained herein are focused on some clear thematic areas, including the recycling of textiles, the use of new and different kinds of feedstock for creating novel textile fibres, smart ways to manage and treat textile effluent in supply chains, and more efficient, environmentally benign ways to dye and colour textiles.

More is happening now in textile innovation than at any time in history, largely due to so much money being ploughed into the issue of sustainability. It also helps that several charitable foundations with fashion industry links are now pouring money into this space, and many of the organisations mentioned in this brochure have received funding of this nature. It would be interesting to know how many of these ideas would have got off the ground without such funding; commercial venture capital sector is notoriously conservative when it comes to backing blue sky thinking and novel technologies.

Finally, a few notes on the development of this brochure. We began compiling it in autumn 2019 and intended to put it out just after Christmas … then a few names we had in mind moved companies and their role changed. Then … coronavirus struck so we decided to put things on hold. We didn't expect this pandemic to go on for quite so long and wreak so much havoc but here we are in July in what has been the strangest few months for all concerned.

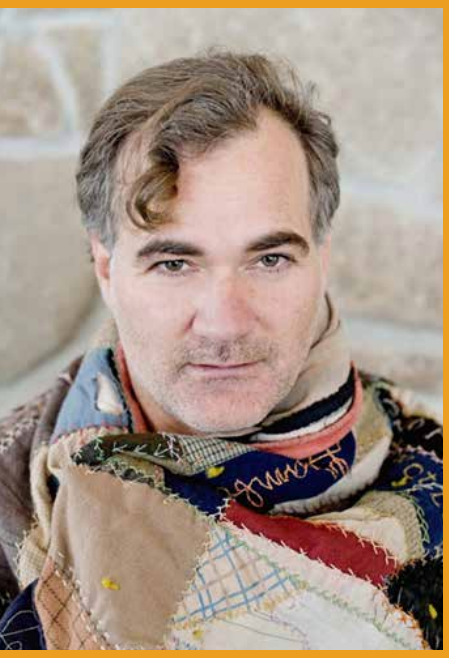
Hopefully, the brochure provides an interesting snapshot of a point in time, capturing an industry in the throes of notable change.

We hope you'll agree, it was worth the wait.

Brett Mathews Editor
Email: brett@apparelinsider.com

Steven Bethell

President and founder, Bank & Vogue and Beyond Retro



Why the work Bank & Vogue does is important and significant from a sustainable textiles standpoint:
Steven has been working in the textile recycling sector for over 20 years. Steven and his wife Helene started their business, Bank & Vogue's, in the basement of their home to help provide service to The Salvation Army, and now employ over 250 staff globally.
Bank & Vogue is now the leading secondhand textile trader in North America.
What's is most interesting is how Bank & Vogue' business has evolved organically over the years. In the mid-90s, the Bethell's set-up Beyond Retro, now one of Europe's largest vintage retail chains.
Beyond Retro was created as response to the large amount of re-sellable garments that continue to be found in the [literal] mountains of secondhand clothes.
More recently, the business evolved again. Beyond Retro label is an in-house re-design brand that has upcycled more 600,000 garments to date.
To build on this, Bank & Vogue's Holdings Services offers scaled circular economy solutions to the fashion industry including remanufacturing and re-design services, feedstock for textile recycling companies and more. Through cross-industry partnerships Steven and his team are starting to see a big shift in the industry.
Bank & Vogue's partnership with fibre-to-fibre recycling company Re:Newcell proves that secondhand textiles are a viable feedstock for chemical recycling, and their partnerships with brands such as Converse Renew prove that upcycling textiles is both commercial and possible at scale.

"I love my job. Finding value in used items is amazing. I'm excited about finding out how we can make 'used' a part of the landscape of new manufacturing"

Graham Ross

Co-founder, Blocktexx

Why the work Blocktexx does is important and significant from a sustainable textiles standpoint: The fashion and textile industry is undergoing its biggest change since the industrial revolution. The work of BlockTexx is at the forefront of textile innovation and resource recovery.
There is now an incredibly large gap between the amount of clothing made and the amount that is currently recycled. Fabric and garment production is increasing year-on-year, meeting and driving fashion consumption to record levels.
Until now, the tsunami of unwanted clothing has been held back by secondary markets, where clothing is resold into developing economies around the world. The sheer volume of textile waste flooding the globe means secondary markets for unwanted clothing are now closing or becoming too unprofitable to continue. The reality is that most clothing is destined for landfill.
The answer lies in how we define textile recycling and the need to acknowledge textile waste for what it is - a valuable resource that should be recycled for reuse.
The chemical separation of materials is an emerging technology, but an exciting one. The BlockTexx S.O.F.T. process recovers the raw materials of everyday products such as sheets, clothing and towels for reuse back into fibres and fabric. This business model is environmentally focused, diverting textile waste from landfill and reducing the industry's reliance on raw material production.
Meeting the growing consumer demand for sustainable fashion, global brands are now committing to using sustainable textiles and the production of 100 per cent recycled product lines.
BlockTexx has developed solutions to meet the demand of this future fashion industry.

"Every day at BlockTexx, I work on products that reduce the fashion industry's impact on the planet and in turn, provide opportunities for brands and consumers to play their part also by choosing sustainable products"

Stacey Flynn

CEO Evrnu

"When I had my wakeup call in 2010 I was faced with the effects of how damaging the textile and apparel industry is to the environment and people, but this is not how the story ends. I am most inspired by my business partner, our team and the collaborators who have joined forces with us to rethink how we redesign the system of making and remaking clothing so we can begin to draw down impact to natural resources. It's incredibly gratifying to be a part of the solution, not the problem"

Why the work Evrnu does is important and significant from a sustainable textiles standpoint:
Stacy's work at Evrnu is aiming to make it possible for the global textile industry to adopt a new way of handling end-of-life and unwanted textiles. With Evrnu's unique NuCycl garment to garment recycling technology, textile waste is regenerated into more sustainable alternatives for the world's highest demand fibres. Through targeted fibre innovation Evrnu is aiming to radically change the textile performance and impact equation.
In late 2019, the company closed a US$9m round of Series A funding – an illustration of the huge industry interest in this area.
The process for NuCycl begins with discarded clothing being diverted from landfill and sorted. Garments are disassembled, shredded, and broken down to the molecular level. The raw materials are then engineered into a new fibre profile, which is spun into yarn by selected mills.
Evrnu, debuted its recycling technology with the launch of a limited run of recyclable, unisex hooded sweatshirts for Adidas by Stella McCartney.
In terms of logistics, Evrnu has its own extrusion line in New Jersey and a chemical lab in Seattle, as well as a pilot plant in South Carolina. The company also plans to work with multiple available commercial solvent systems in production alongside global fibre makers. The technology is proven and Evrnu now has some key commercial partners in place.

Kelly Drennan

Founding executive director, Fashion Takes Action

Why the work Fashion Takes Action does is important and significant from a sustainable textiles standpoint:
In 2007 Kelly founded Fashion Takes Action, Canada's only non-profit whose mission is to advance sustainability through education, awareness and collaboration.
Kelly convenes the Ontario Textile Diversion Collaborative (OTDC), with more than 30 stakeholders committed to increasing textile diversion and recycling. She is leading a public awareness campaign to help consumers understand the importance of the 7R's of Fashion (reduce, reuse, recycle AND rent, repurpose, resale and repair) and has been working to change both provincial and federal regulations related to textile waste.
The group is now focused on a textile recycling feasibility study (both mechanical and chemical) to determine the business case for reusing and recycling pre and post-consumer textiles in Canada, which includes identifying new end markets.
Since 2014, Kelly has produced the World Ethical Apparel Roundtable (WEAR), the only Canadian conference that brings global experts and thought leaders to Toronto to share best practices with apparel brands and retailers. This year, she has partnered with PwC to develop the first Sustainable Fashion Toolkit, featuring hundreds of vetted global resources located in one centralised online platform, easily searchable by category (circularity, water, materials, labour, chemicals, climate change and SDGs).
Kelly developed FTA's youth education programme My Clothes My World for students in grades 4-12, which teaches them about the social and environmental impacts of fashion, while arming them with the tools and solutions to become more responsible consumers. One workshop – the Fashion Impacts Challenge – provides stewardship activities for students through clothing swaps, clothing drives and upcycled fashion shows.
In 2017 Kelly was recognised as a Canadian environmental leader with the esteemed Clean 50 Award for her work in Education & Awareness.

"In the 12 years since starting FTA, I have seen great progress toward more sustainable business practices, as well as more responsible consumption. Knowing that our work is contributing to this shift is what motivates me to continue to deepen awareness and to push for better collaboration in order to shift the needle even further"

Meriel Chamberlin

Founder, Full Circle Fibres

Why the work Full Circle Fibres does is important and significant from a sustainable textiles standpoint: Full Circle Fibres is an Australian fibres, yarns and fabric manufacturing company. Founder Meriel tells us, "We are set up so we simply don't have to exploit people and place to make great, fairly priced things that can be recycled or composted, including those we need, like socks and undies, and we aren't just talking about it, hoping someone else will act on the hope, we are doing it.
"There isn't going to be a single fix, as each place, climate, community and culture has different needs and local resources, whether that be for fibre and manufacturing, agriculture, renewable energy supply or water security. So all we can do is apply a set of principles of cradle to cradle approach and fairness for everyone at each stage.
"The solutions require us to get a lot more sophisticated in our approach, opening our minds to the fact that dogmatically ruling in or out certain fibres, farming methods or supply locations is incredibly counterproductive, nothing replaces knowing your own supply chain, and designing products really well fit for purpose, with a long life or lives, and an available path to recycling or composting.
"For example, my grower uses organic compost, it's an added cost, for which there is no immediate market advantage, but it works well on his soil and over ten years it has improved as a result. However, if a grower two hours' drive away used it, it may not work as well, as the soil is different, so our solutions for industries are about people reconnecting on the ground with their suppliers, wherever they are. Scale that challenge nationally or globally and we immediately see a set and forget, tick box approach, will never deliver.
"We have to build new models that share prosperity at every stage, so we build communities with enough and we can reward those who care and restore at each stage. from the farmer through to the designer and all the brilliant manufacturers and engineers in between."

www.fullcirclefibres.com

"I love what I do, I've always loved making things, and I love working with great factories and farmers, it's that simple, I just want everyone to have a fair piece of the pie, and great growers and makers to be celebrated for doing things as they should be done, instead of being pressured into 'it'll do' quality in crazy volume in the race to the bottom"

Michela Puddu

Co-founder, CEO & chairwoman of the board, Haelixa

Why the work Haelixa does is important and significant from a sustainable textiles standpoint: Given the complexity of today's globalised textile supply chains, environmental and social issues have been increasingly growing. Pursuing a commitment to sustainable and ethical practices, Michela Puddu advocates for supply chain transparency and traceability to become imperative in the textile industry.
During her PhD at the ETH Zurich she has co-invented a product marking technology which enables traceability by equipping products with a unique physical fingerprint from manufacturer to retailer. Distinct DNA markers, uniquely identifying a producer, location or batch, are sprayed to natural fibres,such as cotton, at the farm and potentially any node down the supply chain.
The tracers can be identified and quantified at a later stage with a simple bio-analytical paternity test that unravel product origin, history and integrity (e.g. detection of blending with lower quality materials), ultimately verifying product claims.
Michela Puddu later co-founded the ETH spin-off Haelixa to ensure the further development and commercialisation of this disruptive solution, with focus on the traceability of sustainable and ethically manufactured textile products, such us organic cotton and wool.
Haelixa currently works with all the stakeholders (producers, manufacturers, brands, non-profit) to unravel complex supply chains, thereby helping businesses to protect their image, minimise the risks of frauds/recalls, and implement credible sustainability. With some products already in the market and some others under development, the company aims to provide the next level industry standard for supply chain management.
By mitigating potential negative impacts on supply chains, Haelixa helps in improving consumer trust while contributing to SDGs related to environment, green jobs, human rights and equal working conditions.
For her outstanding, inspiring work in bringing this innovation to market and active leadership, Michela Puddu has been awarded the 2019 EU Prize for Women Innovators (under 35 category).

www.haelixa.com

"Transparency is the first crucial step towards a sustainable and ethical consumer goods industry: at Haelixa I have the chance to truly make a difference through a solution of social and environmental benefit"

Renzo Raso

HeiQ R&D chemist, started with HeiQ in July 2017

Why the work of HeiQ and Raso is important and significant from a sustainable textiles standpoint:
Renzo has a PhD from ETH Zurich with his thesis on air cleaning strategies and regenerable air purifiers. This specialty translates to working on projects such as developing air purifying textiles.
According to the World Health Organization, over 80 per cent of urban residents are exposed to high levels of air pollution. While outdoor pollutants can penetrate homes through ventilation systems, windows and doors, indoor sources of air pollution are often neglected. These include VOCs emitted from furniture, household cleaning products and sprays. These pollutants, though invisible to the human eyes, are trapped inside the home and can be harmful to individuals and the family.
Renzo has been working on developing technologies that give fabrics the ability to capture and break down invisible VOCs that are floating in the air inside the home. This mineral-based technology is applied to textiles and does two things – first, it captures indoor air pollutants such as acetaldehyde. Second, it interacts with light to break down indoor VOCs – similar to a plant photosynthesis, it breaks down certain substances and turns them back into oxygen and water.
By adding this type of sustainable technology to curtains or other home textiles, people will be able to breathe cleaner air inside their homes.

"In our fast-moving environment, we are confronted with new challenges and new boundary conditions daily, forced to think outside the box and come up with viable solutions quickly. We are not going to be successful every time, but – in this spirit - we truly have the chance to make a difference day by day"

Una Murphy

Senior innovation manager, Levi Strauss

Why the work Una does is important and significant from a sustainable textiles standpoint: During her 18 years designing garments at Levi Strauss & Co., Una Murphy has been pushing the boundaries of what's possible in denim with regard to fabric, design, fit and wash design. Her recent work has focused on how to do all of this through the lens of sustainability, with emerging materials and new platforms in innovation and apparel creation methods. She is a core member of the design team behind the company's Wellthread line, which makes sustainable and circular thinking central to the design process from the outset, then looks to scale solutions to have the widest possible impact.
LS&Co. has used Wellthread to produce its most circular garments to date and to introduce innovative new fibre strategies such as cottonized hemp, which will be integrated more widely across the company in coming seasons. Murphy was also the first designer in residence at AutoDesk's renowned Pier 9 Innovation Workshop, where she pioneered a hybrid design practice that explored the intersection of digital fabrication and new materials in a craft heritage context.

"I enjoy being able to design in a way that reduces the environmental impact of the clothes we make. As designers, we should make clothes people love, but we also need to find innovative solutions that solve the design challenges around sustainability and circular design and move us towards a more sustainable apparel industry"

Jane Palmer

Founder and CEO, Nature Coatings Inc.

Why the work of Nature Coatings is important and significant from a sustainable textiles standpoint: Throughout her life and career, Jane Palmer has always been drawn to natural products including natural personal care products, fabrics and dyes. A love of textiles led Jane to pursue both her undergraduate and graduate studies in this area, including the science behind making the products we wear and live on and around every day.

Jane is a serial entrepreneur, and it was through founding and running a successful natural dye business in Los Angeles that she became aware of the negative impacts of producing and using traditional petroleum carbon black.

As this is the most-produced pigment in the world, the effects of creating the colour black are far reaching - burning fossil fuels and resulting greenhouse gas emissions, excessive water use, toxic water runoff, and carcinogenic properties, to name a few.

Jane later set out to answer the question: How do you create a colour black that is high performing and a drop-in replacement for current carbon black, but without the harmful by-products? This was the genesis of Nature Coatings.

Jane went back to her roots, began experimenting with natural materials and processes, and with a ton of patience and persistence over many months developed multiple bio-based and sustainable products suitable for a range of applications including printing, coating and pigment dyeing for textiles, to name a few.

The company is currently planning pilots and launches with a number of large fashion brands, and expects to have its products widely available in the coming months.

"What inspires me every day in my business is the mission of creating bio-based pigments that can be high performing while at the same time combating climate change, using less resources and overall being healthier and cleaner for the people who use them"

Enrica Arena

Co-founder, Orange Fiber

Why the work Orange Fibre does is important and significant from a sustainable textiles standpoint: In Italy alone 700,000 tons of citrus by-products is disposed each year. What if citrus juice by-products could be turned into innovative fabrics, contributing to solve two problems - the environmental and economic impact of citrus juice leftover disposal and the need for sustainable materials in the fashion industry - at a time?

This was the thinking behind the establishment of Orange Fibre. This Italian company has developed an innovative process which reduces the costs and environmental impact of pollution related to the industrial waste of citrus transformation, extracting from it a raw material which is suitable for textile spinning.

Further, Orange Fiber solution offers the opportunity to satisfy the increasing need of cellulose for the textile industry, thus preserving natural resources.

Compared to existing man-made fibres from cellulose, either from wood or from hemp and bamboo, Orange Fiber does not require dedicated yields alternative to food consumption or dwindling on natural resources, but reuses a waste thus saving land, water, fertilizers and environmental pollution.

Orange Fiber is a patented process which allows Enrica and her team to create fabrics from all types of citrus: from orange to lemon, from grapefruit to bergamot.

"I really love my job because it gives me the opportunity to contribute concretely to make a difference, contributing to create a greener and sustainable Fashion and Textile Industry and generating economic and social development through sustainable and circular models"

Dr Christina Dean

CEO Redress

Why the work Redress does is important and significant from a sustainable textiles standpoint: Redress is a Hong Kong NGO which provides awareness around and solutions for sustainable fashion. It is estimated that 80 per cent of the environmental impact of a product is locked in at the design stage. We know from multiple life cycle analysis that raw material processing and the fabric production stage represent the highest offenders in terms of apparel's overall negative environmental impact. With this in mind, the team at Redress seeks to educate designers about sustainable design techniques, including sourcing up-cycled and sustainable materials.

Having witnessed a huge lack in access to sustainable design education throughout Redress' 12-year history, Christina and her team has forged significant access to educate designers, particularly in Asia, directly through its website's multi-language LEARN platform and educational videos, which in 2018 alone had nearly 400,000 hits. and through prolific in-person and online lectures.

Through launching and running the Redress Design Award, the world's largest sustainable fashion design competition, it has over 120+ fashion institution partners worldwide who use its teaching materials, available in a combination of English, Chinese, French and Spanish, and who promote and disseminate its educational guides to emerging designers.

In 2018, Christina and her team wrote and launched a designer guide, 'Sustainability in Fibres', which has been widely viewed across the global apparel industry.

"I love my job - which is more of a way of life than a 'job' - because it requires ruthless focus, enormous creativity, constant hustling and negotiating, a sense of humour and lots of humility and somehow these threads all combine into a team spirit that is resilient and focused on achieving our vision - to prove that fashion can be a force for good"

Nicole Basset

Co-founder
Renewal Workshop

Why the work Renewal Workshop does is important and significant from a sustainable textiles standpoint: Apparel and textile brands lack systems to recover value from unsellable inventory. For garments that have been produced but which cannot be sold, the creative, physical, natural and financial resources invested in them are lost. This leads to massive waste problems with negative environmental impacts, significant financial losses for brands and missed opportunities for consumers.

The Renewal Workshop provides a completely circular and sustainable solution for apparel and textile brands by taking discarded products and turning them into Renewed Apparel (cleaned, repaired, certified to like-new condition) to be sold again.

On average 70 per cent of the products received - which would have been waste - can be renewed and sold again. Items that cannot be repaired are upcycled or recycled for feedstock.

More importantly, The Renewal Workshop gathers data on all products that flow through our system. It collects:

- Impact environmental data – brands understand how much water, carbon emissions, etc. they have been able to save through renewal.
- Consumer use data - brands receive feedback on issues with their products from real-life consumer use.
- Repairability and recyclability data - brands get information on design elements (such as seam allowance, zipper stitching, and materials used) that can inhibit repairs or recycling.

"I grew up on the unceded territory of the Wet'suwet'en people, where I was taught to honour the earth. Humans have created a linear economy that does not serve the planet and I get to provide an opportunity to align economic structures to natural systems. I love my work because I get to do that every day"

Jenny Fredricsdotter

Circular business manager, Re:newcell

Why the work Re:newcell does is important and significant from a sustainable textiles standpoint: Swedish tech business has created a new type of dissolving pulp to create Circulose, which is produced using post-consumer and post-industrial cotton waste.
Re:newcell takes old jeans, t-shirts and other worn out cotton clothes and transforms them into a new natural material without – it is claimed – quality loss.
The company has a production plant Kristinehamn. With the goal of producing 7,000 tonnes of Circulose annually, it's the only production plant in the world that is ready to recycle on a scale that will make completely circular garments available to a global audience.

Jenny Fredricsdotter said: "I work with brands and manufacturers to bring the world's first chemically recycled cellulose material, Circulose, to consumers. By replacing virgin materials with Circulose, the industry could cut its environmental impact drastically, while at the same saving precious cotton from going into landfills and incinerators. Going circular and sustainable at scale means changing a lot of things, from design choices to waste disposal practices. Brands need technology and knowledge to help them move beyond capsule collections and one-off green-washing projects. And they need it now, because if this industry doesn't transition to circularity at scale it will end up killing the planet."

"It is challenging to change linear mindsets and established ways of doing things. I've learnt the ins and outs of this industry over the course of two decades and changing it is a mammoth task. But working to scale up this technology lets me do my part to save the things that I love most, nature and fashion. I'm really lucky"

Traci Kinden

Founder, Revolve Waste

Why the work of Resolve Waste is important and significant from a sustainable textiles standpoint: Textile waste is a well-recognised problem, but there is still a limited understanding of what exactly it is, where it is, and how to return it to the front of the supply chain.
Overcoming that barrier is important, because one of the critical ingredients of a circular system is eliminating waste. That means balancing consumption with the amount of available resources, reuse, reuse, reuse, and (of course) recycling. Unfortunately, recycling is neither technically nor economically feasible without characterizing the waste to know exactly what it is, mapping how it's geographically concentrated, and defining which types of waste can be recycled through which kinds of technologies.
This is a growing area of interest, however, there is still relatively little knowledge on this topic. As the pressure to address climate change increases and consumers begin to demand products that are made without exploitation, circularity has presented itself as an enormous opportunity for the transformation of the textile industry. A clear picture of where the resources are, where they leak out of the system, and connecting companies who are doing the right thing will drastically accelerate that transition.
Traci applies her deep expertise in textile waste, recycling technologies, and circular textile flows to elevate industry knowledge, provide foundational data, and foster connections between good actors. She works with individual companies, non-profit organisations, and consortia to enable the industry's transformation from linear to circular, sooner rather than later.

"Textile waste has the potential to help people, make the planet better, and benefit the bottom line. I can't imagine a more valuable use of my professional time"

Herbert Guebeli

Managing director, Sedo Engineering

Why Sedo Engineering's work is important and significant from a sustainable textiles standpoint: Switzerland-based Sedo Engineering develops technologies for the denim industry, with a particular focus on denim production and denim dyeing, the latter of which is a hugely resource-intensive process in global denim supply chains.

Founded in 2014, the company's Smart Indigo innovation uses electricity instead of chemicals for the indigo dyeing of denim fabrics.

Smart Indigo is a ground-breaking technology. This direct electrochemical process has been designed to reduce indigo pigment to its soluble state in a process which eliminates the need for hazardous chemicals such as sodium hydrosulphite. Smart Indigo requires only indigo pigment, caustic soda, water and electricity to make the dyestuff in what the business describes as a 'fully automated process.'

This pre-reduced liquid is then fed directly into the denim dye bath. Sedo has had orders in Italy, Pakistan, China and Bangladesh for its technology and has seen a huge spike in business in recent years as denim mills globally look for ways to slash water, energy and chemical use.

"We enjoy developing new technology – we like to improve environmental situation towards more sustainability. Jeans and Denim is fashion we love – we like to improve this specially"

Annica Larsson

Project manager OnceMore, Södra

Why the work of Södra is important and significant from a sustainable textiles standpoint: Annica Larsson Ahlstedt is the project manager for the team in charge of driving forward the groundbreaking 'OnceMore technology of Södra, the Swiss international forestry group.

In 2019, the company announced a pioneering patent-pending technology to separate polyester and cotton from discarded textiles containing polyester and cotton blends and then add the separated cotton to its dissolving pulp. The result is a textile pulp containing 3 per cent recycled textiles today, but Södra is aiming to increase this to 50 per cent recycled content.

This new material will then enter the textile value chain once more. Once separated, the polyester is then incinerated and the heat is used to drive the process and produce electricity. Södra is also looking at new ways to recycle the polyester.

Annica is now heading up the team which has taken the idea from pure research in Södra's labs to a feasible market concept; as is development manager at the company's Mörrum mill, where OnceMore technology will be rolled out. Mörrum makes the company's dissolving pulp for textile fibres but OnceMore is a totally new raw material which required considerable technical expertise to introduce successfully.

"It's not often you get the chance to really make a difference in life, possibly at a global level, but I have that chance, and that's really fantastic. This is very much a team effort and its success will not just be about our ability to develop the process, but about creating the demand among consumers and brands, understanding sustainability values so we do this in the right way, sourcing textile waste and establishing an effective raw material flow to the mill, growing partnerships and seizing market opportunities. We believe OnceMore is truly unique, a world first with the potential to be a game-changer for the fashion industry and the environment"

Juha Salmela

Chief technology officer Spinnova

Why Spinnova's work is important and significant from a sustainable textiles standpoint: The recycling technology of Swedish tech business Spinnova doesn't use any harmful chemicals or produce any waste or side streams.
In Spinnova's production process, pulp is converted directly into textile fibre without harmful chemicals, in a process based on mechanical treatment only, fibre suspension flows and rheology.
The pulp flows through a unique nozzle, where the fibres and fibrils rotate and align with the flow, creating a strong, elastic fibre network. The fibre is then spun and dried, suitable for spinning into yarn and then knitting or weaving into fabric elsewhere.
There are no waste streams in this closed process, with the only side product being evaporated water, which is also recycled back into the process.
Juha told us: "Our innovation is born out of my experimental research of paper making related fibre suspension flows and rheology. The fibre we have created is the most sustainable in the world; it involves no harmful chemicals or dissolving, uses a minimal amount of water to produce and comes with no side or waste streams or microplastics."

"I am very lucky to be able to use my research background to create and scale up something that can really revolutionise the textile material base. This whole area is endlessly interesting, as we can use almost any type of cellulose, including waste streams, so as you can imagine we have our hands full for the rest of our lives. Next priority, however, is to roll out the wood-based fibre product, which is piloted now in Finland"

Enrique Perales

Technical director of warp dyeing, Tejidos Royo

Why the work of Tejidos Royo is important and significant from a sustainable textiles standpoint? Spanish denim mill Tejidos Royo was the first textile operation in the world to incorporate the use of large-scale indigo yarn dyeing equipment that uses foam to dye indigo cotton yarns.
This remarkable technology shortens the production steps typically required to dye indigo yarns and leads to significant improvements in terms of reduced water chemicals and energy use.
Foam dyeing is an area the textile industry has looked at for many years. A key stumbling block has been that for indigo dyeing, the dye reacts with air trapped inside the foam and this stops it penetrating the cotton fibre. To get round this, Tejidos Royo uses foam blown with nitrogen – instead of oxygen.
Enrique said: "We believe that our work should not only be important and significant, it is also necessary. Since 2006 we have been developing foam dyeing, with the aim of reducing the high consumption of raw materials, chemicals, energy and water.
"Today we can say we have reached a first goal called Dry Indigo. With the development of this technology, we have managed to modify the conventional indigo dyeing process, creating a unique dyeing process that dye the indigo yarn without using water. Dry Indigo means100 per cent less water for Dyeing, 89 per cent less chemicals, 65 per cent less energy usage and zero water discharge. That is, we have achieved the goal to change history, in this case, the history of Indigo dye."

"Since the beginning of Tejidos Royo, social responsibility with people and respect for the environment has been a norm for our company. We continue researching and developing to launch new ideas - must never stop improving"

Lesley Prior

Wool grower and stud owner at Tellenby Merino in Devon, UK

Why the work of Tellenby is important and significant from a sustainable textiles standpoint: For the last 15 years Lesley has been developing and refining a strain of Merino which will thrive in the UK and in similar conditions in Europe. Tellenby has worked very closely with Australian colleagues to source the right genetics and import them. While Europe will never compete with Australia on bulk volume, there is growing interest from brands in a 'home grown' option. Europe has a 250 year tradition of growing Merino which declined in the last century as wool was replaced by synthetics and meat became a priority. The UK Merino strain originated in Saxony before being exported to Australia in the early 19th century. Tellenby is completing the circle – bringing Merino home after 200 years of development in Australia! The result of Lesley's work is traditional, high-crimping superfine wool of around 16.5micron on the back of a robust sheep which does well here, and also in Romania, Austria, Switzerland and The Netherlands – the countries Tellenby has exported to so far.

Lesley says: "For me, sustainability means always working within the limitations of my land and the wider local environment. Our farm is on the edge of Exmoor. It's high, cold and rains a lot! As a result, it grows wonderful grass, but not much else. Our sheep manage the environment perfectly. We need no fertiliser except what they produce. All we add is some lime occasionally to counteract the very high acidity from the underlying geology. The sheep thrive on unimproved pastures and a low stocking density. Without their help, this place, which has been farmed for over a thousand years, would be impossible to manage and revert to scrub. Biodiversity would reduce and we would lose many rare species of plants, insects and mammals. We think we have the balance just right. Nature and farming working together in harmony. At a time when wool is riding the wave of a great revival, for certain niche markets, this provides the perfect back story. Top quality Merino, locally grown, locally processed within Europe."

"I have a passion for fine wool and the sheep that grow it. Merinos are amazing creatures and I stand in awe of any animal that can eat grass and turn it into the softest, most versatile natural fibre I know. It repels water and yet also allows skin to breathe, is extremely warm, yet keeps you cool in heat, and, it is flame retardant. "It's our privilege to look after a large flock of these sheep and share their lives. Animal welfare is crucially important. A miserable sheep produces poor wool. Ours enjoy a good life. They are quiet, friendly, curious and unafraid, leading long, productive lives. We currently have animals aged 13 still growing acceptable wool and living happily as part of a retirement group. Males are also kept as wool growers – either as breeding rams or as castrated males who spend all year eating and growing wool. We have no need to produce lambs for slaughter"

Emmanouela Kouroudi

Sustainability manager, Ihrakika Ekkokistiria SA, Cotton Ginning & Trading

"Like our culture, our cotton is exported all over the world. But it will only have one home. Greece. I love my job, because with it, I give voice to the farmers, and also make Greek cotton popular to the final consumers, who since lately, didn't know that Greece, and Europe, produce cotton"

Why is your work important and significant from a sustainable textiles standpoint: Emmanouela told us: "In Greece, a ginning mill is the connection between the farmers and the whole supply chain. It is the ginning mill that has the main role, of embracing the farmers into sustainability practices and also provide to the next steps the highest quality cotton.

"I think that production using sustainable practices is more necessary today than ever before. Climate change reminds us of this fact every day. The damage that has been inflicted on the planet is so extensive, that action needs to be taken immediately. I strongly believe, that in collaboration with the farmers, and together with all the parts of the supply chain, the company takes part in formulating a view about how the industry should proceed in order to halt the destruction of the planet."

Chief scientific officer, Tyton Biosciences

Julie A Willoughby, Phd

Why Tyton Bioscience's work is important and significant from a sustainable textiles standpoint: Virginia–based start-up Tyton BioSciences earlier this year raised US$8m in a first round of funding led by Tin Shed Ventures, the investment arm of the clothing brand Patagonia.
Tyron has developed a technology to recycle textiles. It uses subcritical water - water heated under pressure to temperatures above its boiling point - to extract a cotton-containing pulp and break chemical bonds in polyester. Fibers made from the extracted material can be used in place of virgin material, the company claims.
While strides are being made to create more sustainable textile manufacturing practices, the means to recycle textile products into equivalent products are lacking.
In addition to turning textile waste from kilograms of essential chemical building blocks to commercial tons, Tyton's research initiatives are led with a vision of sustaining and securing an environment for "future generations of humans and the health of the Earth's ecosystems and resources".
Says Julie: "There is still much research needed to accomplish this goal using better chemistry, process sustainability and an overall lower carbon footprint. We aim to close the research gap."

"Being part of the Tyton team brings all my education and past experiences together. I have a responsibility to put my talent and time towards preserving our environment. On a personal level, my ten-year-old daughter loves clothes and her 21-year-old brother insists that we source them from only sustainable means. With fast fashion saturating the marketplace, how can she not be influenced to want the latest trends worn by her friends? Serving as Tyton's chief scientific officer is an honor and one that I am committed to seeing us bring our vision to commercial reality. I am proud to tell my children that what I do matters and to influence their choices with the positive outcomes of my chosen vocation"

Adam Baruchowitz

CEO, Wearable Collections

Why the work of Wearable Collections is important and significant from a sustainable textiles standpoint: Wearable Collections is a US-based for-profit company that has collected and processed unwanted clothing in New York City for more than 15 years.
According to the company's CEO, Adam Baruchowitz, 6 per cent of the city's residential waste stream is textiles, and only 15 per cent of that material is collected by agencies like his, either charities or for-profits – the US has a notoriously poor textile collection rate and a huge landfill issue.
Wearable Collections keeps 95 per cent of what it collects out of landfills and this work has seen it reach an estimated 20 million pounds kept out of landfills, in total, by the end of 2020.
About half of what his company collects are wearable items, and these items are shipped to redistributors worldwide, who in turn resell to other companies or individuals for second-hand use. Roughly 45 per cent of collected textiles are shredded for use into rags or low-grade fibre products, and less than 5 per cent is unusable in any form.
Adam says: "As the world moves towards a more circular economy we plan on playing a key role in keeping clothing out of landfills while linking up with innovative solutions both mechanical and chemical for textile reuse. Doing all of this in the fashion capital of the world has led to greater impact than we could have imagined."

"When you look at the advancing circular economy keeping clothes out of landfills (collections) and recycling are two important dots on the circle. We are connecting some of those post-consumer dots in order to maximise reuse. Materials in our apparel will be considered as a feedstock for new textile raw materials so keeping them in circulation is key. That is our expertise"

Cyndi Rhoades

Founder, Worn Again Technologies

Why the work they do is important and significant from a sustainable textiles standpoint:
For the last decade, Worn Again Technologies has been working to develop an environmentally friendly, physical chemistry and solvent-based polymer recycling technology which has the potential to recycle the raw materials in up to 80 per cent of all textiles, globally.
Cyndi says: "Polyester, made from oil by-products takes huge amounts of energy to produce. Vast amounts of water, pesticides, land use and energy are needed to grow and produce cotton. With our process, the industry will be able to swap these environmentally high cost resources with existing, non-rewearable textiles as inputs which would otherwise be heading for landfill or incineration, a waste of perfectly good resources. The process is environmentally beneficial, as measured in life cycle analysis work, compared to virgin production and linear consumption because the process uses less water, energy, land (and no pesticides) and will prevent the need to drill for high levels of virgin oil - of which 70 million barrels a year are used to make the world's polyester fibre."
Worn Again Technologies' says that its solution, as well as helping towards eradicating textiles to landfill, will also enable brands, with their supply chains, to make new textiles with 'circular' raw materials from old textiles at a competitive price to virgin and without passing on a premium to consumers.

"What I love most about driving a business (with a lofty ambition) forward is knowing that, in time, what we are doing has real potential to change an entire industry for the better. It's enough to get me out of bed every morning, despite the difficult twists and turns we face"

Mark Nichols

CEO Xeros Technology Group

Why the work of Xeros is important and significant from a sustainable textiles standpoint: Xeros is working to reduce the environmental footprint of industries and processes such as garment and textile processing, and domestic and commercial laundry. Each consumes vast amounts of water, energy and chemistry and are responsible for enormous emissions of carbon, chemicals (polluting water) and – now, microplastics.
Xeros products improve the efficiency of these processes by reducing the consumption of water by up to 80 per cent and halving the amount of energy and chemistry required. Xeros has also developed a microplastic filtration system, designed to be installed in washing machines of any size, which can virtually eliminate microplastic pollution caused by washing synthetic textiles and clothes containing synthetic fibres.
The fashion industry consumes more water than any other with the exception of agriculture. The textile dyeing industry is the second largest polluter of clean water. By 2050, it is estimated that the fashion industry will consume a quarter of the world's carbon budget. Domestic washing machines account for around 10 per cent of household water consumption and washing textiles containing synthetic fibres is the largest source of primary microplastics entering the oceans every year.
Commercial washing machines that use Xeros products are installed in hotels and laundries around the world – and are particularly effective in highly water-stressed areas.
Xeros has a development deal with one of the world's largest manufacturers of domestic washing machines based in China. The company also recently signed an agreement with a major Indian washing machine manufacturer to incorporate its products in their commercial and domestic washing machines sold across South Asia. It has an agreement with an Indian manufacturer of large-capacity washing machines used in the denim finishing industry to incorporate its products in the machines they sell across South Asia which will potentially save billions of litres of water and reduce carbon and chemical emissions – all of which are a priority for the fashion industry.

"I feel very fortunate to work for Xeros. We are ahead of many in our understanding of the urgent need for us to do things differently and helping to bring about positive change for industry and consumers"

Aleksandra Gosiewski

CEO and co-founder, AlgiKnit

AlgiKnit Inc is a biomaterials company integrating science and design into textile production, creating durable yet rapidly degradable yarns. The company aims to operate in a closed loop product lifecycle, using materials with a significantly lower environmental footprint than conventional textiles, to bring sustainable bio-based textile alternatives to the footwear and apparel industries.

Isaac Nichelson

CEO/co-founder, Circular Systems SPC

Circular Systems is a materials science company, focused on the development of circular and regenerative technologies, transforming waste into fibre, yarn, and textile fabrics for the fashion industry. Its Agraloop Bio-Refinery claims to transform food crop waste into high-value natural fibre products in a cost competitive and scalable way, providing sustainable and regenerative benefits. It can use a range of feed stocks including oil-seed hemp, oil-seed flax, and rice straw as well as pineapple leaves, banana tree trunks and sugar cane bark.

Mike Newman

CEO, Returnity Innovations

Returnity Innovations is a pioneer in the elimination of single use shipping packaging. Returnity builds out sustainable solutions and empowers the systems necessary for companies to shift to circular solutions in packaging. Its products include reusable shipping boxes, bags, and envelopes, reusable shopping bags and other enterprise and consumer reusable products.

Renana Krebs

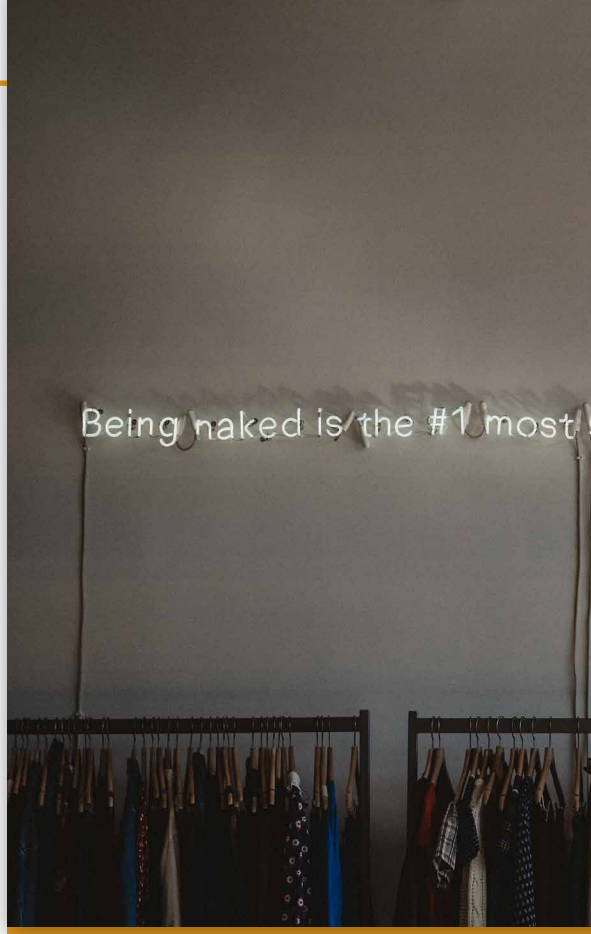
CEO and co-founder, Algalife

Israeli company Algalife has developed a way to turn algae into biofibre and dye in an eco-friendly way. The business has developed pigments and fibres from algae to create biotech textiles. The algae contains proteins and vitamins with anti-inflammatory and antioxidant properties, offering moisture and protection to the skin and body.

Michelle Zhu

co-founder, Tinctorium

Tinctorium produces natural, pre-reduced Indigo dyes that are a drop-in replacement for synthetic Indigo, free of impurities with the same performance as synthetic Indigo. The company uses a biological process to produce the indigo whereby instead of needing the petroleum base for it, the company can literally program bacteria, microbes to grow and secrete the indigo without the need for toxic chemicals.



Molly Morse

CEO, Mango Materials

Mango Materials produces biodegradable bio-polyester that can be used as an alternative to polyester presently utilised in the fashion industry. The potentially circular technology benefits the environment throughout its entire process from renewable feedstock sourcing to carbon recycling at the end of a product's life.

Edward Brial

CEO, HydroCotton

HydroCotton is a UK-based tech business which is developing a technology for cotton agriculture that claims to reduce water and fertiliser by 80 per cent, while also being grown in an insecticide-free environment. In 2021 the business plans to set up its first farm capable of producing commercial volumes of cotton fibre.

Luciano Bueno

founder and CEO, Galy

Galy is a developer of biomaterials using biotechnology and synthetic biology intended to find alternate ways to produce natural textiles. The company creates cotton in a laboratory from cells using a proprietary method instead of plants that is claimed to be faster, higher in quality and cheaper than natural cotton.

Benoit Illy

co-founder, Fairbrics

Fairbrics provides a novel process to create ethylene glycol (a component of polyester) from waste CO2. The resultant chemical is said to be identical both chemically and practically to petroleum-based ethylene glycol. The company's process is said to be cost efficient and the end product is identical to current oil-based polyester.

Joshua Hershcovici

CEO, Sonovia

Sonovia, previously Nano Textile, offers a sustainable alternative to binder chemicals normally used to attach finishes onto a fabric. Its technology embeds fabric finishes directly into fabric using a process called 'cavitation' and can apply to a range of products such as antibacterial & anti-odour finishes or water repellence. The elimination of binders reduces the amount of chemicals used in the finishing process, while the very strong impregnation protects the end-user and the environment from the leaking of hazardous chemicals.

Cam Chidiac

CEO, Dryfiber

Dryfiber provides a PFC-free durable water and oil repellent textile finish which is completely water-bourne and which can be applied through traditional finishing processes. Dryfiber is claimed to be the world's first fluorine-free/biodegradable/bio-compatible oil and water repellent technology. The requirement for PFC alternatives is growing in textiles as legislative reforms means the use of fluro-chemistry will be outlawed in many countries over the next decade.

Guy Carpenter

president, Bear Fiber

Bear Fiber is developing a novel biotechnological 'cottonisation' process and manufacturing platform for fibre production with hemp that uses less water and energy. The cotton-like hemp fibre and yarns can be easily spun with cotton to produce textiles and finished garments.

Dan Widmaier

CEO and founder, Bolt Threads

Bolt Threads is engineering alternatives to common materials such as silk and leather. The company's products so far include Microsilk, a textile spun from the same proteins as spiderwebs, and Mylo, a leather alternative made from the root structure of mushrooms.

Jaideep Sajdeh

joint managing director, Textool

A resident of Mumbai, Jaideep Sajdeh runs a company which collects discarded textiles from various countries and turns them into handbags, backpacks and shopping bags. His company now employs 60 people and is growing on the back of the rapid increase of excess used clothing on global markets.

Shikha Shah

CEO, Altmat

AltMat converts agri-waste to industrial fit fibres and yarn. The company sources agri-waste of plants like hemp, banana etc directly from farmers and agro-producers to achieve competitive economics and scale. The company's proprietary technology then converts this waste into environmentally sustainable, functionally superior and socially responsible textiles.

Narendran Maniam

CEO, Indra Water

Indra Water has developed affordable, fully automated wastewater management treatment and packaged re-cycling solutions. The process the company has developed is capable of a variety of water treatments through novel innovations in electro-coagulation, electro-chemical oxidation, two-phase solids separation, disinfection, distillation and pollutant monitoring hardware. Its solution addresses key pain-points of the existing wastewater treatment industry, wherein majority of the solutions require huge capital investments, are difficult to operate, require huge footprint, generate high quantity of sludge/toxic by-product and can't manage inconsistencies in the influent stream leading to undesirable output.

Parth Patil

co-founder & CEO, InfiniChains

InfiniChains is an end-to-end track and trace solution using blockchain, AI and cloud computing to help brands and manufacturers to digitise sustainability practices, working with some of the biggest companies in the textile industry to bring transparency & efficiency to their supply chains.

Joy Nun

CEO, PurFi

PurFi rejuvenates pre- and post-consumer textile waste back to virgin quality fibres from corporate waste streams to create a potential losed loop solution. The technology can process any type of fibre including cotton, PET, nylon, cotton/poly and blends as well as separate out elastane. PurFi owns 14 patents/patents pending related to rejuvenating industrial waste.

Amit Gautam

CEO and founder, TextileGenesis

TextileGenesis is a blockchain traceability system specifically created for the apparel sector that focuses on fibres such as wood-based fibres, organic cotton and organic wool. Consumers can scan the barcode with their mobile device to see the various steps that were taken to create a particular product. The solution is aimed at protecting reputation against fakes, creating transparency from fibre-to-retail.

Keshav Deo Sharma

co-founder, Descatuk

Descatuk has developed a process of fibre extraction and yarn creation from grass to produce a fabric that has a similar look to linen but a lighter touch. Grown in the highlands of India, the wild grass needs neither water nor pesticides.

Ann Runnel

CEO, Reverse Resources

Reverse Resources is a platform that enables fashion brands and garment manufacturers to address pre-consumer waste for industrial upcycling. The platform allows fabric and garment factories to map and measure leftover fabrics and scraps so that these become traceable through their following life cycles. By mapping the waste material in the factory, these resources can eventually be reintroduced into the supply chain, limiting the use of virgin materials.

Dr Kate Goldsworthy

co-director of the Centre for Circular Design

Kate is a textile designer and academic working to bridge materials science, industry and design through multidisciplinary & practice-led research. Projects include Mistra Future Fashion (2015-2019), the EU Horizon 2020 project Trash-2-Cash (2015-2018) and a longstanding working relationship with Worn Again, a recycling-tech company based in the UK. Her design work has been exhibited internationally at the Museum of Modern Art Boston, The Science Museum and the Institute of Contemporary Art, London.

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