TEXTILE RECYCLING INFRASTRUCTURE

A Global Report



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FOREWORD

For years, textile recycling has been framed as a technology problem. Find the right solvent, crack the chemistry, build the right reactor, and the rest would follow.

I believe this framing has almost run its course.

For sure, the technology still matters, and real breakthroughs are still happening. Companies around the world are working to scale new processes for polyester, cellulosics and blended fibre waste, and doing genuinely important work.

But we're hitting diminishing returns on the core chemistry, and the harder question now is a practical one: can the industry build systems that move used textiles from waste stream to industrial feedstock? And can they do this reliably, at scale, and at a cost that makes commercial sense?

That's what this report is about.

Textile recycling infrastructure isn't just the reactor or the dissolving vessel. It's everything else. It's the collection networks, reverse logistics, sorting lines, fibre identification, pre-processing, feedstock preparation, plant siting, material handling. And then the downstream pipelines needed to turn recycled outputs into fibres, polymers, pulp or yarns that someone will actually buy. Neglect any of those pieces and the whole chain stalls (and, to a certain extent, already is doing).

The past 12 to 18 months have seen more real movement than at any point in the last 15 years, and the most significant shifts have been in what one might describe as “infrastructure thinking.”

As this report was being prepared in April 2026, Fashion for Good launched Feedstock Activation Europe (Project FAE) focused specifically on the sorting and pre-processing systems needed to supply recyclers with usable feedstock. This work is backed by Adidas, Bestseller and Inditex as well as – and this is key - 40 sector players including recyclers, sorters and others across the value chain.

Before that, in May 2025, the EU-backed T-REX project published its roadmap for scaling textile-to-textile recycling in Europe. Tellingly, its leaders flagged that the biggest remaining hurdles aren't technical. They're around cost, scale and the lack of robust collection, sorting and recycling infrastructure.

Both projects reflect the same shift in thinking. Proving a recycling pathway in principle is no longer the main event. Building the upstream and downstream conditions that let it run commercially is where attention has moved. The technology is no longer the bottleneck. The sorting lines, pre-processing steps and supply systems are.

The sector keeps growing, and the venture capital keeps flowing. There are more technologies, more pilot plants, more announced commercial sites than two years ago. But the surrounding infrastructure remains uneven and, in many regions, still can't deliver the cost, quality and consistency recyclers need to operate.

This report is a high-level global picture of where textile recycling infrastructure stands in 2026. It looks at how the main parts of the value chain connect, where key companies sit, and what the current wave of activity actually means. It also includes responses from governments around the world on what they are doing to facilitate circularity in textiles, as well as industry feedback.

The sector is no longer starting from scratch, but it's still a long way from a complete, functioning global system. What exists in 2026 is something in between.

It’s better funded and more industrial than before but still working to connect all the pieces into something that can genuinely scale.



Brett Mathews
*Editor, **Apparel Insider** and publisher of the **Inside Textile Recycling** newsletter*

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INTRODUCTION

When we started pulling this report together, one thing stood out almost immediately: textile recycling has outgrown its niche.

Brands, recyclers, sorters, machinery companies, policymakers, investors and manufacturers are all in the conversation now, in markets across the world. This subject touches waste policy, fibre supply, climate commitments, trade, green claims, recycled-content targets (key for us) and the longer-term direction of apparel production. That range, while on the one hand a sign of how seriously the issue is being taken, also makes it genuinely difficult to get a clear picture.

Textile recycling gets talked about as though it is a single, coherent market heading in one direction. What actually exists is a loose and uneven collection of systems, technologies, trade flows and commercial projects at very different stages of development.

Our Inside Textile Recycling Newsletter which we launched on LinkedIn at the start of 2026 shows just how diverse and fragmented this space is.

Some parts of the market are well established while others are barely off the ground. Some companies are moving significant volumes today, mainly relating to mechanical recycling. Others are still proving their process, raising capital or trying to piece together the supply chains they need to operate at all.

This report is our attempt to give an honest account of where things stand in 2026.

We wanted to take a *practical* (emphasis on that word) look at the infrastructure taking shape around textile recycling globally. That includes where the activity is, how the value chain works, which regions are moving fastest, where the bottlenecks are and why progress remains so uneven despite growing investment, policy attention and commercial interest.

The report also draws heavily on direct conversation. In preparing this report we spoke with recyclers, machinery suppliers, sorters, technology developers, brands, researchers and others who work with textile waste day to day. What they told us largely matched what our own reporting suggested. There is real momentum in the sector, but the system supporting it is still in a state of flux.

Textile waste itself is not in short supply – on the contrary – but the harder question is whether that waste can be collected, sorted, identified, cleaned, de-trimmed, pre-processed and delivered to recyclers in a form that actually works, technically *and commercially*. The same issues kept coming up in conversation after conversation: feedstock quality, sorting costs, contamination, blended fibres, trims, logistics, unreliable supply and margins that leave little room for error.

That is why so much of this report focuses on infrastructure. A recycling facility is just one part of a much longer chain. Material has to be captured and prepared before it arrives, and after recycling the output still needs a buyer, a manufacturing route and a price that can compete in a market built around cheap virgin fibres.

The regional picture varies considerably. Europe has the most progressive regulatory environment, with mandatory separate collection and extended producer responsibility pushing the issue harder than anywhere else. However, policy ambition is running well ahead of physical capacity. The sorting, pre-processing and large-scale recycling infrastructure needed to handle what Europe wants to keep in circulation simply does not yet exist at sufficient scale.

North America has large waste volumes and real industrial potential, though its recovery systems are still underdeveloped. California is shaping up as an important policy test, and projects from companies including Reju and Syre suggest the US could play a more significant role in the next phase. Both have made major moves in the past 18 months.

Asia already sits at the centre of global textile manufacturing and has considerable experience in mechanical recycling, particularly in India and Turkey, while Vietnam, China and Bangladesh are also growing in importance. Parts of this activity are formal and industrial, while other parts remain fragmented and hard to track.

Mechanical recycling is the most mature segment, with established roots in cotton and wool recovery and genuine volume behind it today. Its constraints (feedstock quality and fibre degradation) are well known.

Chemical recycling is where much of the sector's ambition is focused, especially for polyester and blended materials, but it is capital-intensive and faces the same upstream challenges around supply consistency and sorting that affect everything else.

What exists in 2026, then, is a sector that is more serious and more visible than it has ever been, but still a long way from the “circular supply chains” that appear in brand strategies and policy documents.

It is also, inevitably, a snapshot. The market is shifting quickly. Some of the projects covered here will look quite different in two or three years. Some will scale, while others may not survive; expect more casualties along the way.

Policy shifts, recycled-content mandates, investment cycles and trade flows will all reshape the picture, and *Apparel Insider* plans to return to this work in future reports.

While challenges in textile recycling remain significant, the story is certainly not one of failure. Activity is growing and the scale of effort going into this space is greater than we have seen before. But the next phase will be harder than the last.

It will be less about announcements and PR, more about the slow, costly and often unglamorous work of building infrastructure that can actually ensure the industry scales.

CHAPTER 1

THE STATE OF PLAY IN 2026



Textile recycling has had a strange 18 months. Enough has gone right that the sector can no longer be dismissed, but enough has failed, or just stalled, that the optimism of a few years ago has waned at times.
The pilot phase is mostly over. The bigger challenge now is turning a promising technology into a working business. That means reliable supply, steady demand, fair pricing and enough investment to make textile recycling work at scale.

Textile-to-textile recycling is no longer a niche talking point. Brands, recyclers and investors broadly accept that fashion can't hit its circularity numbers by leaning on bottle-derived polyester, mechanical recycling and export markets.
The tricky part is that technology has been moving faster than the commercial infrastructure, and that gap is causing real problems.
The clearest sign of where things stand is the Renewcell collapse. When the company went bankrupt in 2024, it exposed something structural.
Brands had been enthusiastic - capsule collections, public pledges, press releases - but none of that translated into the offtake volumes and pricing needed to sustain a large industrial plant.
The business that emerged, now operating as Circulose, has spent 2025 rebuilding on different terms, securing partnerships with H&M, Mango, Bestseller, John Lewis, C&A and Reformation

> „ Even ambitious projects will cover just a fraction of global demand for years. Technologies must still prove they can handle real-world waste, with dyes, elastane, blends and contamination ”



among others.
The technology survived but will the original commercial model re-emerge stronger?
That lesson is filtering through the market. Recyclers have worked out that selling innovation isn't enough. They are now pitching supply security, traceability and compliance readiness.
Brands, meanwhile, are slowly accepting that circular materials can't be bought like commodity fibres when the infrastructure doesn't exist yet.
Long-term offtake agreements carry far more weight than one-off launches. Lululemon's 10-year deal with Samsara Eco, Ganni's four-year agreement with Ambercycle, Nike's work with Syre - these point to a shift in thinking. However, whether the commitments are bankable enough to unlock full-scale investment remains an ongoing question.
Polyester recycling has seen the most activity. Syre, Ambercycle and Reju are all pushing textile-to-textile recycled polyester, addressing a real problem: most recycled polyester in fashion still comes from plastic bottles, increasingly seen as the wrong feedstock.
But this challenge is huge. Even ambitious projects will cover just a fraction of global demand for years. Technologies must still prove they can handle real-world waste, with dyes, elastane, blends and contamination. Feedstock has to be collected, sorted and delivered at the right spec. That supply chain still barely exists.
Carbios illustrates the gap between promise and delivery. Its enzymatic PET recycling has attracted serious industrial partners, but the company's Longlaville plant has been delayed and the China project with Wankai has slipped back. First-of-a-



> „ The sector is better positioned than two years ago, with better technology, more credible companies, longer brand commitments ”

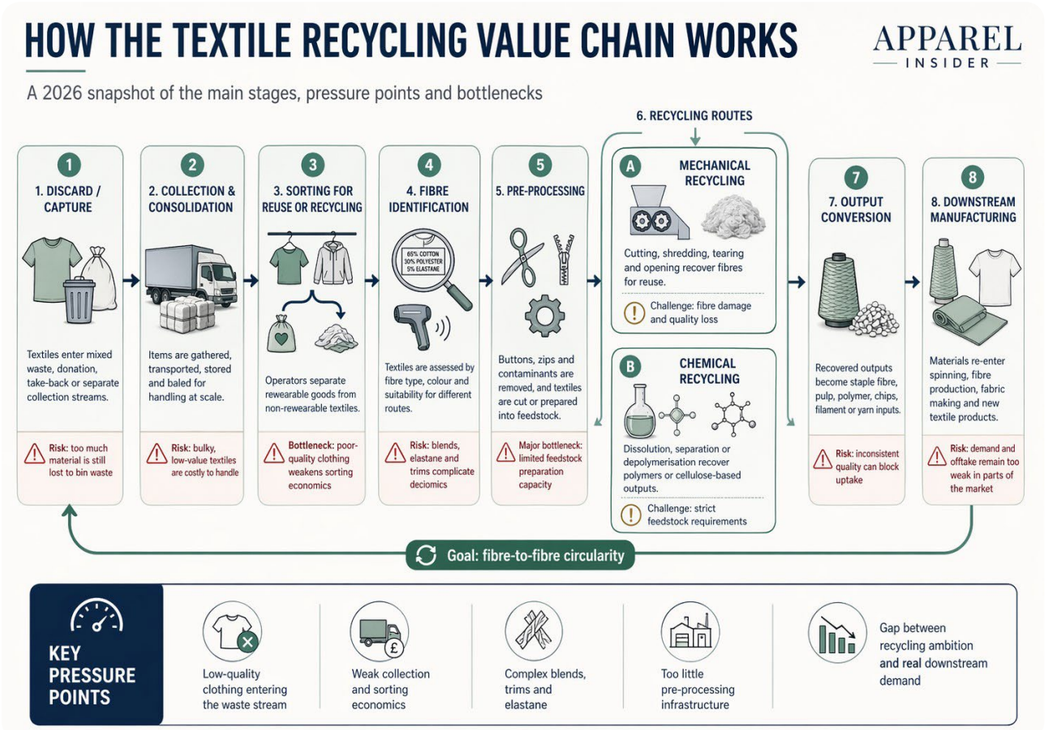
kind plants are genuinely hard to finance, especially when investors are asking harder questions about timelines and returns.
Cotton, cellulosic and blended textiles each carry their own constraints. Mechanical recycling shortens fibres and needs virgin blending. Mechanical recycling, while vital, is just one piece of the jigsaw.

Blended fabrics are harder still, which is why Circ's polycotton separation work is notable. Most clothing waste isn't mono-material, and circularity will need to find a way to deal with that reality.
Policy has become central. The T2T Alliance launch in 2025 - Circ, Circulose, RE&UP, Syre and others - was a signal that recyclers have concluded voluntary brand action won't be enough. Without mandates and recycled content requirements, virgin fibre will keep winning on price.
The sector is better positioned than two years ago, with better technology, more credible companies, longer brand commitments.
But the structural problems remain. Collection is fragmented, sorting under-resourced, financing fragile. The next test isn't about capability. The sector can produce the goods.
The test is whether it can evolve into a fully functioning industrial system at the scale the challenge at hand requires.

CHAPTER 2

THE TEXTILE RECYCLING VALUE CHAIN





The textile recycling value chain doesn't begin at a recycling plant. It begins the moment a product stops being used and, in (far too) many cases, it begins badly.
A worn-out T-shirt, a stained duvet cover, a damaged pair of jeans. Each enters the system as a mixed, uncertain material. It might still be reusable or it might only be suitable for recycling. It might be too contaminated, too complex or low-value to recover economically at all.
That's why the textile recycling chain is still far from a neat loop. It's a sequence of filters, decisions and losses, with material either staying in play or falling out at each stage.
The European Environment Agency states that in 2020, only around 4.4kg of textiles per person were collected separately for reuse and recycling across Europe, while 11.6kg per person ended up in mixed household waste. With the onward march of ultra-fast fashion, it's likely that these figures have not improved.

STAGE ONE: CAPTURE

If a textile goes into mixed waste, the value chain ends there. Separate collection, take-back schemes, charity donation, resale channels and municipal systems are what bring material into the chain at all. While this sounds basic, it remains one of the biggest weak points in the entire system.

WRAP found that in the UK, nearly half of all used textiles (around 35 items per person each year) are still put in the bin by households. In California, data tied to the Responsible Textile Recovery Act shows that Californians disposed of around 1.2 million metric tonnes of textiles in 2021, making textiles roughly 3 per cent of the municipal solid waste stream.

Thus the problem isn't only how to recycle textiles. It's how to get them into the right system in the first place. A value chain can't function if a large share of material never reaches it.

STAGE TWO: CONSOLIDATION

Once captured, textiles have to be gathered in volume, moved, stored and prepared for sorting. This is where the economics start to bite. Used textiles are light, bulky, inconsistent and often low-value. They are expensive to move relative to what they're worth.

They may also arrive wet, mouldy, badly packed or mixed with non-textile waste. WRAP's ACT UK work makes clear that the UK needs domestic systems capable of capturing worn-out textiles, sorting them and pre-processing them at scale, centred on a future network of Advanced Textile Sorting and Pre-Processing facilities. Its business-case modelling looked at a standalone facility handling around 25,000 tonnes of worn-out textiles annually, which gives a practical sense of the volumes needed for this stage to work economically.

STAGE THREE: SORTING

Sorting is one of the most important (and fragile) stages in the chain. It decides what a textile becomes next. Some garments are still suitable for reuse and go into second-hand markets. Others are damaged, stained or outdated but may still hold fibre value. Others are so poor in condition or composition that they're genuinely difficult to place anywhere useful. This is where the idea of a single "textile waste stream" breaks down. In reality, the chain is full of different streams with very different values and different destinations.
Sorting also helps shine a light on the current fault line between reuse and recycling economics. When reusable items hold their value, they help support the wider cost of collection and sorting.

> „ Used textiles are light, bulky, inconsistent and often low-value. They are expensive to move relative to what they're worth ”

When the incoming mix is dominated by low-quality clothing, the burden on sorters rises sharply, and the whole system feels it (as has been the case in recent years).

EuRIC and Municipal Waste Europe warned in October 2024 that prices for sorted second-hand garments had fallen so far that, since spring 2024, they no longer covered processing costs. The result has been serious cash-flow problems for sorting operators and warehouses filling up with material with nowhere to go.

These issues are ongoing and have led to the issues highlighted in the boxout on page 14.

STAGE FOUR: IDENTIFYING FOR RECYCLING

Beyond separating reusable from non-reusable, material has to be identified by fibre composition, colour and technical suitability for downstream processes. A cotton-rich white stream is not the same thing as a dark polyester-cotton blend with elastane and heavy prints. A chemical recycler may need a very specific feedstock window, while a mechanical recycler may need a different one entirely.

McKinsey's work on scaling textile recycling in Europe identified collection, sorting and pre-processing as the main barriers to fibre-to-fibre scale, noting that recyclers often have strict input requirements for fibre composition and purity.

Most legacy sorting infrastructure was built around

Over the past 18 months, Apparel Insider's reporting has pointed to a widening gap between circular-fashion rhetoric and the challenges of the used-textiles trade. On one side sit collection and take-back schemes. On the other sit the sorters and recyclers expected to absorb the material. The pressure has been most visible where the back end of the system is weakest.

In October 2024, Soex applied for insolvency proceedings under self-administration, a major warning sign from one of Europe's best-known used-textiles players. That same month, AI reported EuRIC's warning of an "existential threat" to recyclers and sorters, with prices for sorted second-hand garments no longer covering processing costs.

The strain deepened in June 2025, when Texaid's German subsidiaries filed for insolvency, and again in July 2025, when Le Relais dumped used clothing outside French retailers and suspended collections to highlight what it called a funding crisis. By February 2026, France had raised exceptional support for collection and sorting operators to €268 per tonne in an effort to prevent insolvencies and protect capacity.

resale value. Moving from a charity-and-export model to a true recycling chain requires new kinds of fibre identification, automated sorting and specification-based separation. WRAP's ACT UK project makes exactly that argument, suggesting that scaling automation could improve efficiency, cut costs and raise feedstock quality.

STAGE FIVE: PRE-PROCESSING

Pre-processing is where sorted textiles get turned into something a recycler can actually handle. It is also one of the clearest bottlenecks in the whole system.



It can mean removing buttons, rivets, zips and labels, cutting garments apart, separating problem components, reducing contamination and preparing material into feedstock fractions that meet specific recycler requirements.

Recent French work for Refashion (2025) shows just how granular this gets. Its study found that 78 per cent of textile items had at least one external recycling disruptor made of metal, plastic, fabric or other material. Zip fasteners feature prominently, while multi-material composition (anything involving more than two materials) complicates recycling and limits downstream applications. Elastane above 5 per cent makes textiles difficult for recycling and can cause defects in the recycled output.

STAGE SIX: RECYCLING

After pre-processing, the chain splits into recycling pathways. The two broad categories are mechanical and chemical, though even that distinction slightly oversimplifies things.

Mechanical recycling means physically breaking textiles back down into fibre - cutting, shredding, tearing, opening, garneting. It's most established in cotton-rich and wool-rich streams and works best when incoming material is relatively homogeneous and reasonably clean. A pre-sorted cotton stream can be cut and shredded into fibre that's blended and re-spun.

But the process shortens fibres and reduces quality, especially if the feedstock is mixed or already degraded. The Refashion disruptor study shows exactly why: elastane, metallic-plastic yarns, multi-coloured textiles and complex material combinations all create problems for mechanical processes. Mechanical recycling is often presented as the most mature route, but it still depends heavily on what happened upstream.

Chemical recycling offers different possibilities, but it doesn't escape the same upstream logic. A polyester depolymerisation plant still needs a defined input stream with limited contaminants and known composition. A cellulosic dissolution route still needs textiles that fit its process window.

The challenges remain the same as for mechanical recycling - too much elastane, too many trims, too many mixed materials and so on.

THE GEOGRAPHY PROBLEM

The recycling chain doesn't always stay within one region, and that creates its own complications. The EEA reports that the EU exported almost 1.7 million tonnes of used textiles in 2019, up from just over 550,000 tonnes in 2000, with 46 per cent going to Africa and 41 per cent to Asia. In Asia, used textiles are often imported into dedicated economic zones, sorted and processed, downcycled into industrial rags or filling, or re-exported elsewhere.

Material collected in Europe may be sorted somewhere else, reused somewhere else, recycled into low-value products in yet another location, or end up in landfill or informal dumping overseas.

If domestic sorting and recycling capacity are weak, collected textiles get pushed into global secondary markets with uncertain outcomes. Thus there is a clear argument that separate collection systems need to be implemented in ways that don't simply increase exports, incineration or landfill.

WHERE THINGS STAND

The textile recycling value chain in 2026 is a long sequence of capture, consolidation, sorting, fibre identification, pre-processing, recycling and downstream conversion. At every stage, value can be preserved or lost.



Too much material still never enters the chain, while too much of what does enter is low quality. Sorting economics are under acute pressure, while re-processing is underdeveloped.

Ultimately, recyclers still need a far cleaner, more predictable feedstock stream than most collection systems can currently deliver.

WRAP's work in the UK, EuRIC's warnings from the sorting sector, Refashion's detailed evidence on disruptors, the EEA's data on exports and mixed waste, and California's new EPR approach all point to the same conclusion. Textile recycling is a complete value-chain challenge.

Right now, the chain has weak links at almost every stage.

ANDRITZ: BUILDING THE INDUSTRIAL BACKBONE FOR TEXTILE RECYCLING

As textile recycling moves beyond pilots, the question increasingly becomes one of whether the industrial infrastructure exists to support it at scale.
That means more than recycling technology, sorting, feedstock preparation, fibre opening, cleaning, process integration, traceability and reliable offtake markets.
For several years, Andritz has been quietly building that backbone. The Austria-based engineering group supplies industrial equipment and systems across pulp and paper, nonwovens, man-made cellulosic fibres, waste processing and textile recycling.
In the textile recycling chain specifically, it works across multiple process steps, positioning itself as an integrated partner from sorting through to downstream fibre applications.
We spoke with Alexandre Butte, vice president, engineered textiles, and Charles Junker, sales and business development manager, both from Andritz Nonwoven & Textile, about where the infrastructure gaps are, why feedstock preparation has become central to the sector's development, and what a mature textile recycling system could realistically look like by 2030.

Where do you see the biggest infrastructure gap in textile recycling today?



Alexandre Butte: The biggest gap is industrial-scale sorting and upstream feedstock preparation. Collection is ramping up, especially in Europe with separate textile collection requirements, but the system still lacks enough high-throughput, automated capability to turch highly variable post-consumer textiles into consistent, recycler-ready streams.
Without this upstream step, both mechanical and chemical recycling struggle to operate reliably. End markets also cannot depend on stable specifications and traceability.
Closing this gap requires scaling automated sorting and robust preparation. That means removing disruptors, controlling blends and cleanliness, and connecting these steps to downstream recyclers and offtake partners in an integrated value chain.
At Andritz, we address this infrastructure gap through a fully integrated, end-to-end approach covering the entire textile recycling value chain, from sorting and feedstock preparation to mechanical and chemical recycling, and downstream fibre applications.
The latest developments are predictive and automated textile sorting systems, which we see as a key enabler for industrial textile recycling. These systems allow textile waste to be transformed into defined, high-quality material streams. That is essential for both mechanical and chemical processes.

Many brands are making textile-to-textile recycling commitments, but industrial capacity remains limited. What needs to happen for the sector to move from pilots to reliable commercial infrastructure?



Charles Junker: The industry is clearly moving in the right direction. However, several structural elements are required to move from pilot projects to reliable industrial infrastructure.
First, there is a critical need to deploy industrial-scale sorting and preparation systems. Many recycling technologies are already technically viable, but their performance depends heavily on the availability of consistent feedstock.
Second, standardisation of feedstock quality is essential. This is particularly important for chemical recycling, where clearly defined input streams in terms of composition, purity and traceability are required to ensure stable plant operation.
Third, stronger integration across the value chain is needed. Collection, sorting, recycling and end-use markets must be closely aligned, with long-term collaboration between all stakeholders.
Finally, investment security plays an essential role. This must be supported by long-term offtake agreements and the development of scalable project pipelines capable of de-risking industrial deployment.
At Andritz, the focus is less on developing entirely new technologies and more on connecting and scaling proven solutions within an industrial ecosystem. The company's role is to support this transition by providing integrated technologies and enabling validation from pilot to industrial scale.

From Andritz's perspective, what are the main technical bottlenecks in preparing post-consumer textiles for recycling at scale?



Charles Junker: The main bottlenecks stem from the complexity of post-consumer textiles. These include highly heterogeneous material streams, contamination removal and the challenge of achieving consistent fibre quality at scale.
Reliable upstream preparation is essential because both mechanical and chemical recycling depend on well-defined, homogeneous feedstock. That is something that is still not consistently available today.
With more than a century of expertise in the textile recycling market, Andritz addresses these challenges by combining deep fibre processing know-how with advanced technologies for sorting, cleaning and opening.
This integrated approach helps to reduce variability and improve consistency, which is essential for stable industrial recycling processes.

How important is automation in the next phase of textile recycling infrastructure?



Charles Junker: Automation is critical for the next phase of textile recycling because it enables true industrial scalability.
The greatest impact lies in automated sorting and high-throughput fibre preparation. These systems can handle complex material streams, ensure consistent quality and improve traceability.
Automation also significantly reduces reliance on manual processes and increases efficiency across the entire recycling value chain.
In this context, Andritz contributes with predictive and automated textile sorting solutions. These are key elements in closing the gap towards true circularity in the textile industry.
The AI-based Andritz teXscan unit evaluates fabric quality before recycling. This enables efficient material routing for chemical recycling, nonwovens or spinning.
Complementing this, the automated sorting system classifies garments by composition and colour, removes hard components such as buttons and zippers, and prepares materials for further fibre processing.
Together, these technologies create an efficient pathway for transforming post-consumer and post-industrial textile waste into fibres suitable for spinning, nonwovens and composite applications.

There is a lot of attention on chemical recycling, but many processes still depend on consistent, well-prepared feedstock. How critical is front-end mechanical preparation?





Alexandre Butte: Front-end mechanical preparation is essential for the viability of chemical textile recycling.
Chemical processes require consistent, clean and well-defined input streams. These can only be achieved through proper sorting and mechanical pre-treatment.
Without this step, variability and contamination negatively affect process efficiency and scalability. This makes reliable industrial operation very challenging. For this reason, mechanical preparation should not be seen as merely a preliminary step. It is an enabling factor.
However, chemical recycling of textile waste is a vital, emerging business area. It is the piece of the puzzle that completes the picture of textile-to-textile circularity.
This is why it is also called circular recycling. The recycled waste completes a full circle from raw materials to textile, to textile waste and back to raw materials.
Andritz is a leading player in this industry not only because of our expertise in chemical process technology, but also because the recycling processes can utilise the same equipment that we use in pulp and paper production.
Chemical and mechanical processes are fully complementary in the drive to achieve the desired end result, but the addition of chemical treatment is a game changer for textile-to-textile recycling.

What lessons can textile recycling learn from sectors such as waste, pulp, paper, nonwovens and industrial processing?



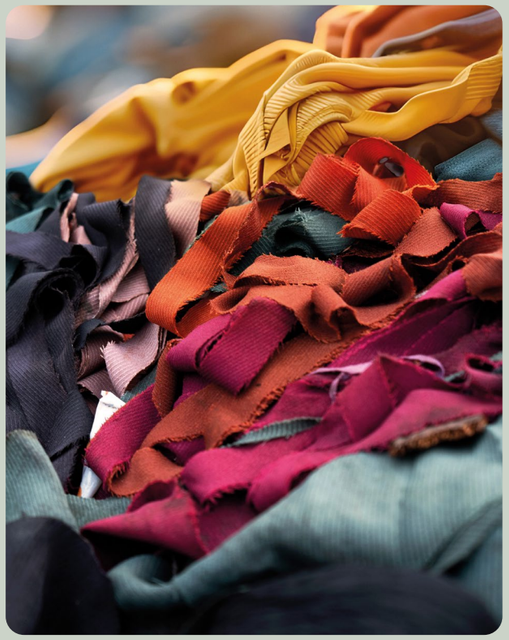
Charles Junker: The textile recycling sector can benefit significantly from more mature industries such as pulp and paper, waste management and nonwovens.
These industries demonstrate the importance of

continuous processing, high-capacity equipment and integrated value chains. They also show how automation and advanced material handling can efficiently manage variability in input streams.
At Andritz, this cross-industry experience represents a strategic advantage.
Existing know-how in fibre processing and man-made cellulosic fibre production, combined with established technologies in pulp and paper, nonwovens and industrial plant engineering, can be transferred to textile recycling.
The key lesson is that success in textile recycling depends on integrating proven technologies into stable, scalable and fully engineered systems, rather than optimising isolated process steps.
Leveraging experience from man-made cellulosic fibre production, nonwovens and other process industries helps to accelerate the development of reliable, economically viable recycling solutions.

How should brands, recyclers, machinery suppliers and policymakers think about the economics of textile recycling infrastructure?



Alexandre Butte: Textile recycling infrastructure must be approached as a long-term industrial investment.
This means designing capex-efficient, modular plants while ensuring reliable feedstock supply in terms of volume, quality and price stability.
At the same time, energy consumption and overall process efficiency must be carefully managed to ensure competitiveness versus virgin materials.
A central element is the establishment of long-term offtake agreements. These provide investment security for recyclers and machinery suppliers, while giving brands access to consistent recycled materials.
Ultimately, the economics work when all stakeholders are aligned across the value chain and share both risks and commitments.
As a technology partner, Andritz supports this by offering scalable solutions that are designed for industrial efficiency and long-term performance.
The evolving regulatory framework in Europe is set to further accelerate this transformation.
The implementation of Extended Producer Responsibility schemes across the EU, together with new obligations under the Ecodesign for Sustainable Products Regulation, will shift the market from a sustainability-driven approach to one defined by mandatory compliance by 2030.
In particular, the introduction of minimum recycled fibre content requirements will fundamentally reshape demand.
This makes it essential for brands, recyclers, machinery suppliers and policymakers to align on long-term investment strategies, secure feedstock streams, optimise energy use and establish reliable offtake structures.
A coordinated approach between regulatory ambition and industrial capabilities will be key to building a viable and competitive textile recycling ecosystem at scale.



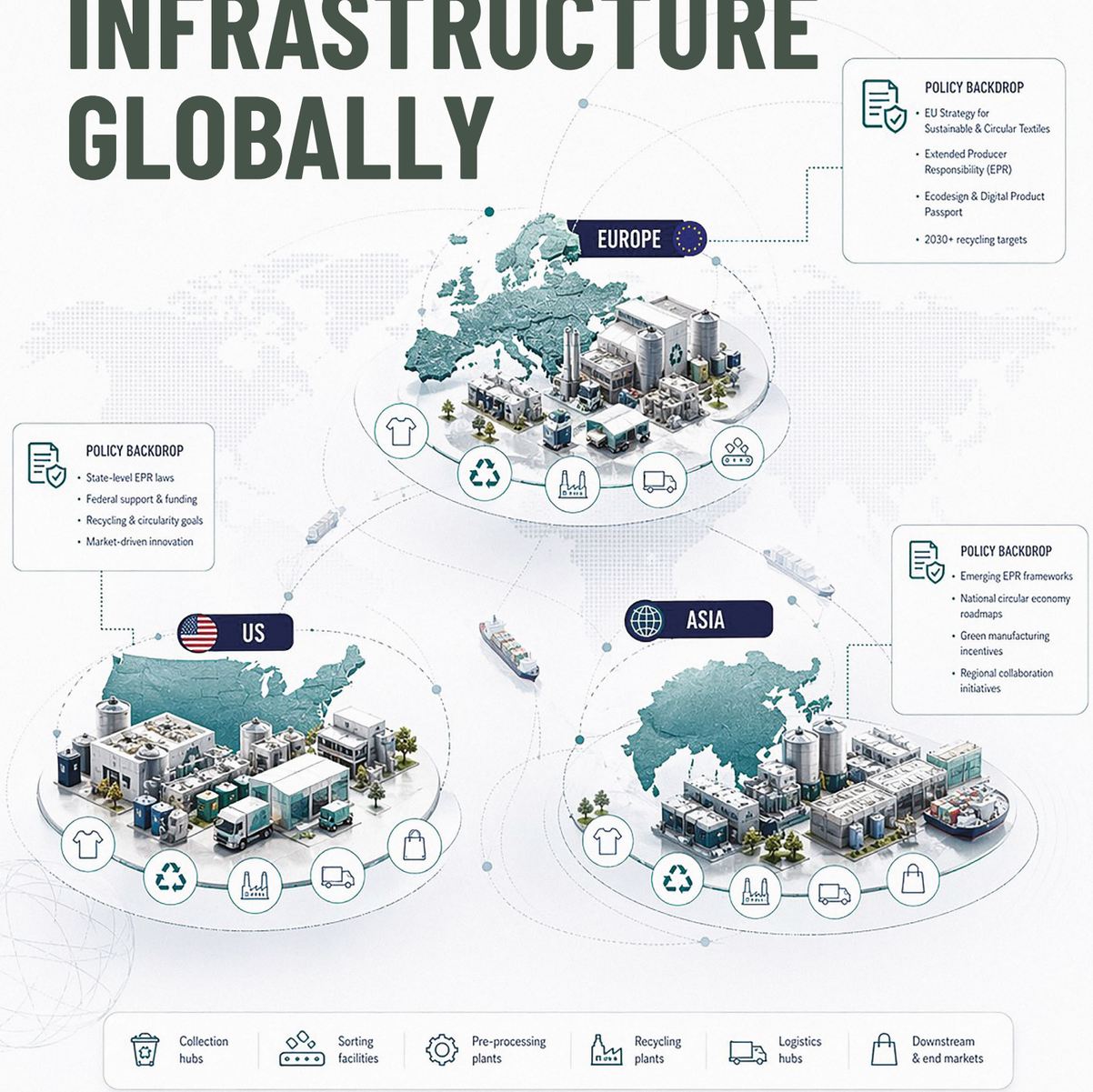
Looking ahead to 2030, what would a mature textile recycling infrastructure system need to look like?

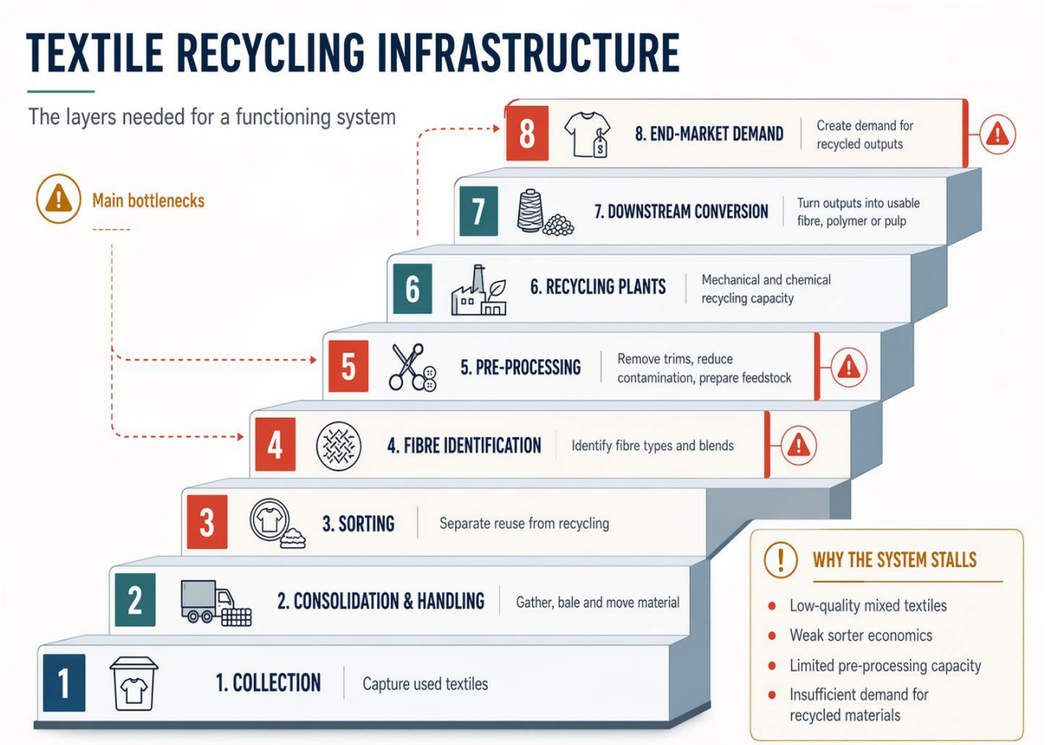


Alexandre Butte: By 2030, a mature textile recycling system is expected to be fully industrialised, with large-scale automated sorting, standardised material streams and integrated value chains from collection to end products.
Mechanical and chemical recycling will complement each other, supported by high levels of traceability and consistent feedstock quality.
Companies like Andritz will play an important role as technology partners and system integrators.
By delivering turnkey solutions, advancing automation and connecting the different stages of the process, Andritz contributes to building scalable and economically viable circular systems for the textile industry.

CHAPTER 3

TEXTILE RECYCLING INFRASTRUCTURE GLOBALLY





This chapter is about textile recycling infrastructure rather than processes. While chapter 2 explained how the recycling chain works, here we look at where the physical system is being built, how far it has progressed in different regions, and which policy frameworks are shaping it.

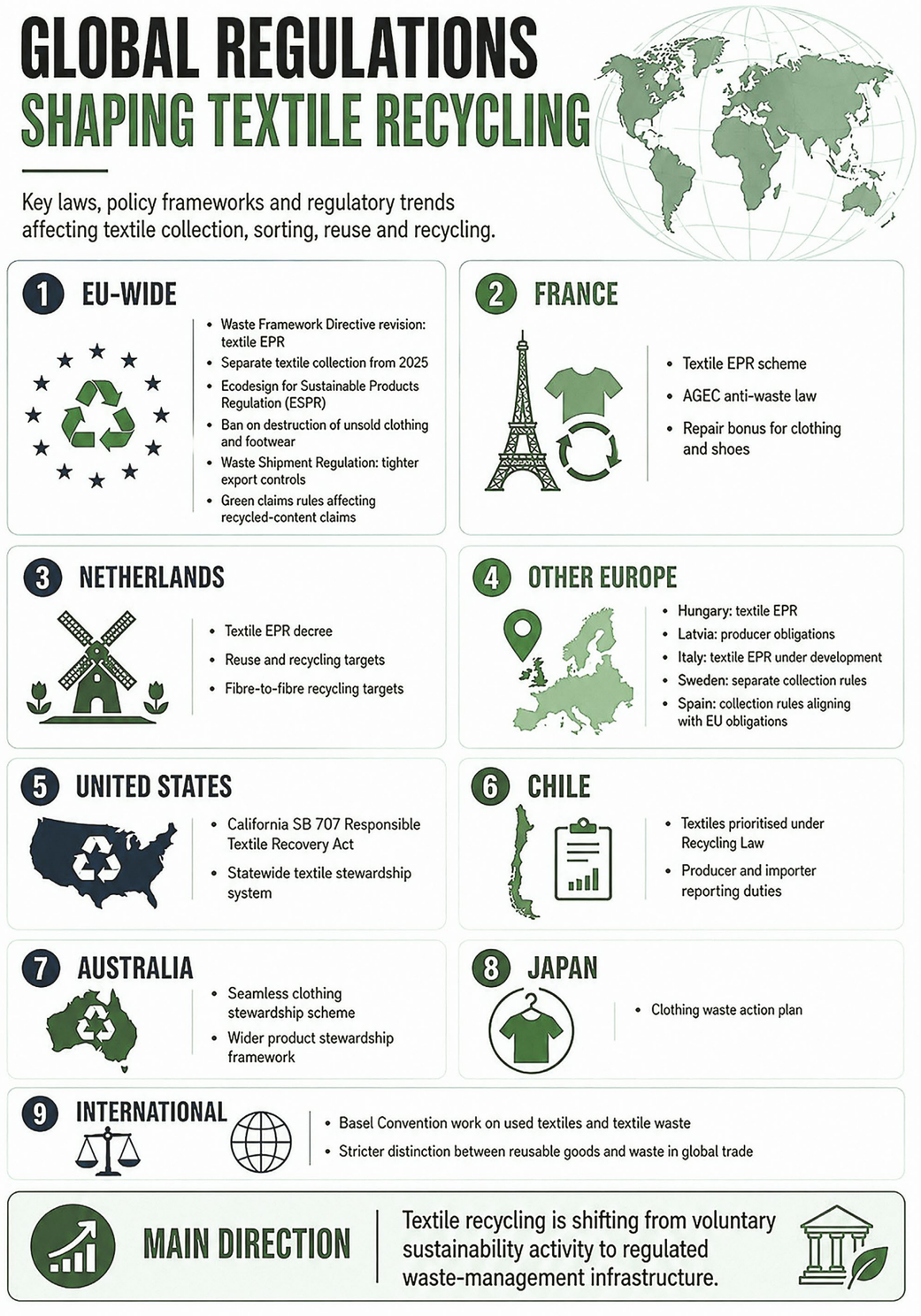
The picture, globally, remains uneven in 2026. While the European Union has the strongest policy push, Asia has some of the deepest manufacturing-linked recycling activity, albeit often with fragmented governance and patchy formal systems.

The US is moving at a much slower rate, with California acting as the main policy test bed (California generally has taken a more progressive stance on sustainability issues in textiles than most other parts of the US).

Across all regions, the same basic truth holds, which is that textile recycling infrastructure remains considerably thinner than fashion's circularity narrative suggest.

Before looking specifically into the regions, it's worth restating what textile recycling infrastructure actually means. It is our take that the conversation around textile recycling too often falls into a discussion about recycling plants alone.

However, a properly functioning system requires collection capacity, sorting and grading, pre-processing, logistics, traceability, recycling capacity and downstream demand for the recovered output. If one of those layers is weak or patchy, the whole system struggles, and potentially breaks down.





THE EUROPEAN UNION

The European Union has led the way globally when it comes to textile recycling policy and efforts to formalise recovery and recycling efforts.

The revised Waste Framework Directive entered into force in October 2025, introducing common rules for extended producer responsibility for textiles. Before that, mandatory separate collection had already kicked in from January 2025. Those two steps mean that collection is no longer optional in principle, and producer responsibility is becoming the framework through which collection and treatment systems get financed and organised.

However, while Europe has taken a policy lead, this should not be mistaken for infrastructure maturity. One of the more revealing recent assessments on this issue came from Zero Waste Europe, which noted in late 2025 that although separate collection had become mandatory from 1 January 2025, it had "not been fully implemented," even as EU countries moved to transpose textile EPR. Regulation alone will not solve the problem.

Many member states are still scrambling to build the collection, sorting and financing systems that policy now demands. The rules are moving faster than the physical infrastructure beneath them.

As ever with efforts to introduce far-reaching regulations, the implementation is where the challenges arise. What sounds like a good idea in theory inevitably hits snags when road-tested in the market.

Efforts to regulate in the EU also come at a time when recyclers and sorters have been struggling to stay afloat.

Indeed, a report from Boston Consulting Group in 2025 described European textile waste as being at a tipping point. While the policy signal is strong, the intent alone doesn't build sorting lines or pre-processing facilities. What makes the situation particularly ironic is that Europe's policy package is pushing more material into the formal system just as sorters and collectors are already struggling with lower-quality feedstock and weak margins. In other words, there is more pressure but less capacity to absorb it.

France illustrates these issues better than any other country. Its Refashion-backed EPR model is probably the most developed textile EPR system in Europe, and yet it has repeatedly needed emergency support to stay functioning. In July 2025 the French government announced a €49m package to shore up the national textile recycling infrastructure after sector protests. By February 2026, support for collection had climbed to €268 per tonne. This was essentially a lifeline payment to keep parts of the system from going under.

This is a major reality check for the whole of Europe on the issue of EPR. If one of Europe's most advanced textile infrastructure models needs that level of intervention to stay afloat, it reveals how difficult the underlying economics actually are. Moreover, there is little to suggest that this challenging economic environment is going to change any time soon.

THE NETHERLANDS

The Netherlands is doing something slightly different from most of its European neighbours. Rather than focusing primarily on waste management, it's trying to actively shape what a circular textile market looks like. Its Policy Programme for Circular Textile 2025–2030 puts "high-grade processing" at the centre, the idea being that textiles collected separately should be processed in ways that preserve enough value for them to re-enter production as raw materials, not just disappear into lower-grade uses.

In the Netherlands, EPR for textiles took effect on 1 July 2023. The programme pushes for more recycled content, stronger sorting, tighter scrutiny of exports and scaled fibre-to-fibre recycling. It sets 5 per cent post-consumer recycled content as the minimum for all textile products and is actively pushing for ambitious mandatory recycled-content requirements under ESPR at EU level.

That is quite notable because, for us, it signals where European infrastructure policy is slowly heading. The shift is from end-of-life thinking - how do we deal with this waste? - to market-design thinking: how do we create a system where recovered material actually has somewhere useful to go?

This is an important distinction. Infrastructure doesn't become viable simply by moving more textiles into the formal system. It becomes viable when sorted and processed material has dependable demand on the other side. It would seem that the Dutch have effectively recognised that demand creation has to be built into infrastructure policy from the start, not bolted on later.

> „ Efforts to regulate in the EU also come at a time when recyclers and sorters have been struggling to stay afloat ”

Even so, the bottlenecks across Europe remain stubborn. Sorting and pre-processing are still weak relative to policy ambition. Many existing systems were built around reuse and export rather than recycler-ready feedstock, leaving a growing mismatch between what policymakers want and what the physical system can actually deliver.

Europe is building the strongest regulatory framework in the world for textile circularity but it still lacks enough advanced sorting, de-trimming, pre-processing and large-scale recycling capacity to make that framework truly effective in practice.

INDIA

Asia doesn't lend itself to easy generalisations. There's no single policy model here, no equivalent of the EU framework to point at. Instead there is a mix of large manufacturing bases, long-established reuse and recycling practices, informal collection networks and a patchwork of emerging national circularity strategies.

If Europe's infrastructure story is primarily about policy trying to build capacity, Asia's is almost the reverse. There is significant industrial depth in some places but formal policy systems struggling to keep up.

India is probably the most important (and perhaps underestimated) infrastructure story in the sector right now. The Ministry of Textiles' 2026 report on the textile waste value chain found the country generates 70.73 lakh tonnes of textile waste annually. Over 95 per cent of pre-consumer textile waste is recovered, and the spinning sector achieves near-100 per cent in-situ reintegration of spinning waste. Those numbers reflect a recycling landscape with genuine industrial depth, albeit one that looks nothing like the EPR-driven systems taking shape in Europe.

The Ministry of Textiles' report also points to cluster-based infrastructure as the logical way forward. Panipat is highlighted as the main mechanical recycling centre, and the case is made that expanding

recycling capacity across existing textile clusters (processing waste closer to where it's generated) makes more sense than trying to build a centralised national network from scratch.

In a country as large and varied as India, that argument makes sense. The industrial knowledge is already there, the waste streams already exist, and the logistics are shorter. Building around that seems more realistic than imposing a top-down model designed for a very different context.

That said, India's strengths have real limits. Much of the recovery and recycling activity sits in fragmented, informal markets where quality control is inconsistent and traceability is weak. Post-consumer systems are far less structured than what's emerging in Europe. And capturing pre-consumer waste well (which India does) is a very different challenge from building the higher-value textile-to-textile recycling routes the sector increasingly needs.

BANGLADESH

Bangladesh is beginning to place textile recycling within a more formal policy framework, although it has not yet introduced a dedicated textile recycling law. The main focus is on the country's large stream of pre-consumer garment waste, known locally as jhut, which has long been traded through informal and fragmented channels.



The most important development is work on a National Strategy on Circular Economy for the Textile and Ready-Made Garment sector. Led by the Ministry of Commerce with support from UNIDO's SWITCH2CE programme, the strategy is expected to set out a more coordinated approach to circularity in the RMG sector by the end of 2026. Policy discussions have included better sorting and collection systems, improved data on jhut volumes, a national online platform for textile waste, incentives for domestic recycling and tighter controls around waste exports.

CHINA

China is genuinely hard to read. It's far too significant in global textile manufacturing to ignore, but solid public evidence about its recycling infrastructure is thinner than for Europe or India, and what does exist is rarely well publicised.

Our own view, based on informal conversations with people working across the industry, is that China is likely to emerge as a global leader in advanced recycling technologies faster than most Western observers expect. We'd also put money on it harnessing AI across the full textile recycling chain in ways that could fundamentally change how the process works, not just at the sorting stage, but further down the chain too.

One concrete story to emerge came in April 2026, when the Associated Press reported on an AI-powered textile sorting machine in Zhangjiagang capable of processing around two tonnes an hour, with a meaningful reduction in unrecyclable waste and a sharp drop in the man-hours needed to sort used clothing. It's one facility, not a system, but it's the kind of development that is likely to get repeated at scale in China once the model is proven.

The broader point is that China appears to be approaching textile recycling through industrial automation and manufacturing logic rather than through the waste-policy frameworks that are driving Europe. That's a very different starting point, and potentially a faster one. Whether it produces a coherent national recycling system with the kind of governance and traceability the sector needs is a different question. But the direction of travel is worth taking seriously.

CHAPTER 4

MECHANICAL RECYCLING



Mechanical recycling is the oldest and most established part of the textile recycling market, and in many ways the most instructive about where the sector stands at the current time.

Mechanical recycling has long-standing industrial roots in wool and cotton, it operates in real supply chains, and it tends to be less chemically intensive than newer routes. It is the most common method for cotton-rich textile waste – essentially, a low-impact textile-to-textile process requiring minimal water or chemicals.

Textile Exchange's Materials Matter Scope and Eligibility Policy (2026) defines mechanical recycling as covering all steps between reclaimed feedstock and recycled output, including collection, concentration, shredding, opening and garneting.

However, there are several challenges and limitations associated with mechanical recycling. It is because of these that the industry has increasingly been exploring chemical recycling routes in recent years.

The mechanical recycling process is highly sensitive to feedstock quality, and the physical act of breaking textiles down damages fibres. A 2025 review in Recycling found that shredding and tearing can significantly degrade fibre quality, limiting reuse potential. In short, while mechanical recycling is proven and practical, its outputs are directly constrained by what goes in and how much damage occurs in processing.

HOW MECHANICAL RECYCLING WORKS

At its core, the mechanical recycling process means physically breaking textile waste back into fibre through a sequence of sorting, pretreatment, contaminant removal, cutting, shredding and opening. Textile Exchange's 2026 framework treats these as a single defined pathway.

The route's appeal lies partly in its (relative) simplicity. It does not require breaking down polymers chemically, it is familiar to most of the industry, and it is already embedded in established supply chains in several regions. As indicated, however, the difficulty is that physical processing shortens fibres.

The more aggressively a textile has to be torn apart, the greater the degradation. The 2025 Recycling review notes that even with relatively clean pre-consumer waste, mechanical processes shorten fibres enough that output needs to be blended with virgin material or directed toward lower-value applications.

Feedstock homogeneity is therefore critical. The same review finds the route works best with cotton, wool and acrylics, where fibre structure can be more reliably preserved. Synthetics such as nylon are far less commonly handled mechanically, due to a combination of technical and economic constraints.

WHY FEEDSTOCK IS THE CENTRAL VARIABLE

Post-consumer waste is the hardest feedstock to work with. Variability is the core problem, as blends, fabric constructions and colour diversity all shift from batch to batch, complicating processing and pulling down output quality. Pre-consumer and post-industrial waste tends to be cleaner, more uniform and easier to identify, which is why it remains the more reliable input for most mechanical recyclers.

This is an important point because a lot of the public and policy conversation around textile recycling starts from the assumption that large clothing waste volumes should translate fairly directly into fibre recovery. Mechanical recycling complicates that picture, to a certain extent. Garments with elastane,



heavy coatings, complex blends or hard trims (or those arriving wet or damaged) yield lower-quality output at lower prices.

Waste volume is not the same as usable feedstock. Thus what happens upstream, in sorting and pre-processing, largely determines whether mechanical recycling produces useful fibre or something that can only be sold into lower-value markets.

GEOGRAPHIC CONCENTRATION

Mechanical textile recycling is already a global activity, but its geography looks quite different from the emerging chemical recycling map.

Most established capacity sits close to existing textile manufacturing, lower-cost sorting labour, open-end spinning and markets for recycled yarns, felts, fillings, wipes and home textiles. That places the centre of gravity toward Asia, Turkey and parts of central and eastern Europe.

Panipat, in Haryana, is widely recognised as a major global hub, handling large volumes of imported and domestic used textiles that are sorted, shredded, re-spun and converted into yarn, blankets, rugs and home furnishings. Recent reporting puts annual processing at around one million tonnes of textile waste, though the sector is highly fragmented and carries well-documented concerns around worker safety and pollution.

Bangladesh shows the other side of the picture. It generates substantial garment factory waste (estimated at up to 577,000 tonnes a year) but only a small share is recycled domestically. Much is exported, including to India, while local processing remains largely informal and focused on lower-value end uses.

Turkey is another significant centre. Uşak, in western Turkey, has developed into a notable recycling cluster, with activity across sorting, fibre opening, regenerated yarn and recycled-content products. Industry sources cite more than 180 factories in the city handling large daily volumes of textile waste.

In Europe, activity is more dispersed. Prato remains important for wool, while Spain, France, Germany, Belgium and the Netherlands all have capacity, albeit limited.

The stronger growth story extends in central and eastern Europe, where sorting networks, lower operating costs and proximity to EU waste streams are attracting increasing activity. EEA-linked analysis identifies existing or planned recycling capacity in Slovakia, Croatia, Bulgaria, Poland and Lithuania, among others.

However, the data across all of this is patchy. The EEA notes that European mechanical recycling capacity is probably underestimated because many smaller sorting and recycling businesses are hard to identify and track. It also flags that most recycled fibres are still downcycled into rags and insulation rather than returned to equivalent textile applications.

In summary, mechanical recycling already operates at meaningful scale across Asia, Turkey and parts of eastern Europe. But the question remains as to whether these largely fragmented systems can be developed into traceable, higher-value fibre-to-fibre supply chains.

SOME KEY PLAYERS IN MECHANICAL RECYCLING

The mechanical textile recycling market is fragmented, with capacity spread across established yarn districts, post-industrial waste processors, wool recyclers, post-consumer sorting platforms and newer fibre-to-fibre plants. The companies below are not the whole market, but they give a useful picture of where the more visible global activity sits.

RE&UP is one of the more ambitious scale-up plays in textile-to-textile recycling. Headquartered in the Netherlands and built on Sanko Group's Turkish manufacturing base, its model goes beyond conventional shredding but is directly relevant to mechanical recycling given its focus on large-scale recovery of cotton-rich, polyester-rich and blended waste into what it calls "Next-Gen Cotton" and "Next-Gen Polyester". The company is targeting more than 200,000 tonnes of annual recycling production capacity from its Turkish operations, with a longer-term plan to reach one million tonnes globally by 2030.

Recover is one of the best-known recycled cotton fibre businesses globally. Headquartered in Banyeres de Mariola, Spain, it uses a mechanical textile-to-textile process to turn pre-consumer, post-consumer and post-industrial cotton-rich waste into recycled fibre and blends for fashion, accessories and home textiles. The company has been building production capacity close to textile manufacturing hubs, with facilities in Spain, Pakistan, Bangladesh, Vietnam and El Salvador. Its Vietnam facility, announced for 2025, was reported to have two recycling lines and annual capacity of 10,000 tonnes, focused mainly on its RMix recycled cotton and polyester blend.

Manteco is one of the best examples of mechanical recycling applied to wool. Based in Montemurlo in the Prato district, the company has recycled wool roots going back to the 1940s and is best known for MWool, its recycled wool fibre platform. The process works from pre- and post-consumer discarded textiles, with colour sorting and fibre recovery reducing the need for dyeing in some applications. A 2025 research paper found that woven fabrics made with MWool retained potential for at least one further round of mechanical recycling in a closed-loop system.

Usha Yarns is a major Indian recycled yarn producer based in the Chandigarh/Punjab region. The company works with recycled cotton, garment waste and recycled polyester to produce GRS-certified yarns in solid and mélange shades. Its 2025 sustainability report states annual production capacity of more than 18,000 tonnes. India is estimated to recycle or reuse around 60 per cent of its textile waste (well ahead of most other apparel-producing countries) and Usha sits inside that broader industrial ecosystem.

Rester is a Finnish mechanical textile recycler focused primarily on business textiles, such as workwear, uniforms, flat linen, towels and production side streams. Based in Paimio, it is often described as the largest mechanical textile recycler in northern Europe, with annual capacity of around 6,000 tonnes. Fibre outputs go into spinning, packaging, automotive, interiors and furniture applications. In January 2025 the company raised €4.9m in a second funding round to support international expansion and further development work.

WHAT IS THE RIGHT FIBRE BLEND FOR MECHANICAL RECYCLING?

There is no settled industry answer on how much virgin fibre needs to be added to mechanically recycled fibre to produce a stable yarn.

The underlying problem is fibre damage. Mechanical recycling shortens fibres, increases irregularity and can reduce yarn strength. Mills typically compensate by blending in virgin cotton, recycled polyester, man-made cellulosics or other longer fibres to improve spinnability, strength and consistency.

How much is needed depends on feedstock quality, staple length, yarn count, spinning technology and the demands of the end product. Some research points to recycled cotton contents of 50 per cent or above being technically achievable. Other work suggests blends with around 20 to 30 per cent virgin fibre deliver meaningful performance improvements, while more recent trials have shown 75 per cent recycled fibre content working in specific applications. This range reflects how variable the inputs and requirements are in practice.

A coarse yarn for denim or knitwear can generally tolerate higher recycled content than a fine, high-strength yarn. Pre-consumer waste tends to perform better than mixed post-consumer feedstock. Textile Exchange guidance notes the need for testing across yarn strength, hairiness and pilling when mechanically recycled cotton is used.

Higher recycled content is achievable, but only where feedstock quality, processing conditions and end-use requirements are in reasonable alignment. That combination is less common than the headline recycled content figures sometimes suggest.



Coleo is a Spain-based textile recycling and circular products business working across waste management, sorting, sourcing and recycled textile products. It operates waste-management plants in Spain and France, including facilities in Galicia, Catalonia and Toulouse. In late 2025 Fundación Repsol said it had acquired a 14 per cent stake in the company to support further expansion. Coleo currently processes more than 2,500 tonnes of textile waste, and its own 2025 update noted that post-consumer textiles had overtaken industrial waste in volume for the first time, making it a relevant marker of the broader shift from cleaner post-industrial feedstocks toward more difficult post-consumer material.

Bangladesh's emerging recyclers: Bangladesh does not yet have a strong presence in global mechanical recycling branding, but it is becoming more strategically significant because of the sheer scale of its garment waste. Reuters reported in 2025 that the country generates an estimated 577,000 tonnes of textile waste annually but recycles only a small share domestically, with much exported or disposed of informally.

Local businesses including Recycle Raw and Broadway Regenerated Fiber are working to formalise and grow the sector. Recycle Raw is one of the country's largest waste-processing operations; Broadway Regenerated Fiber has called for greater collaboration between brands, suppliers, waste handlers and recyclers to unlock investment. Bangladesh is not yet a mature mechanical recycling hub on the scale of India, but the feedstock base makes it a geography worth watching.

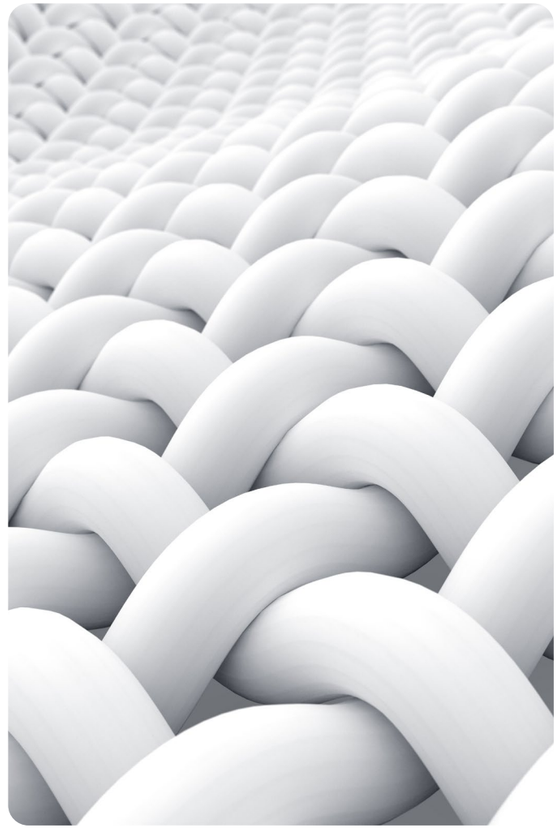
REGULATORY PRESSURES

Mechanical recyclers face regulatory questions that do not always receive adequate attention. A significant practical issue is how end-of-waste status is defined for sorted and processed textile outputs. EuRIC argued in April 2025 that end-of-waste criteria must reflect the operational realities of textile collection, sorting and recycling, and that textiles with minor defects should not be excluded by overly rigid definitions. EuRIC supported the Joint Research Centre's approach, under which end-of-waste status for mechanical recycling would apply only once output is ready for direct use as a textile product or as an input into new textile production.

This is a key point because mechanical recyclers sit at the intersection of waste regulation, product standards and industrial practice. Unlike chemical recyclers, which can position themselves as advanced technology platforms, mechanical recyclers are directly exposed to the day-to-day difficulty of handling mixed, degraded post-consumer material. If end-of-waste definitions are poorly calibrated or compliance burdens disproportionate, the players doing the most immediate fibre recovery work face additional obstacles to scale.

WHY THE SEGMENT REMAINS CRITICAL

Chemical recycling grabs much of the publicity



(and VC funding) but mechanical recycling remains the most commercially advanced part of the textile recycling market. It handles real volumes of cotton-rich and wool-rich waste today, not in projected pipelines. It operates at lower chemical intensity than alternative routes. It has genuine industrial depth in districts like Prato and in the globally distributed networks that players like Recover are building.

More than any other part of the sector, it also exposes the feedstock problem facing all recyclers. Poor-quality clothing does not yield quality fibre. The process works where sorting is rigorous, feedstock preparation is disciplined and there are realistic expectations about what comes out the other end. In regions with weak manufacturing bases, fragmented waste streams or inadequate sorting infrastructure, those conditions rarely exist, and the economics reflect it.

SYRE SETS OUT TO SCALE CIRCULAR POLYESTER

By **Dennis Nobelius**, *CEO of Syre*



***ABB** - Industrialisation in action at ABB: in Vietnam, ABB equipment is prevalent in almost in all premium industrial parks*

At Syre, our first phase was all about establishing major commercial interest, building a strong investor base, and securing access to key technologies ready for scaling. The direction is clear and well underway, showcased commercially through our key partners H&M Group, Nike, and recently announced Target, as well as our strong investor base.

Having world leading brands committing long-term in the biggest agreements in the textile industry, and global investors sharing the mission, is the strongest baseline we could wish for.

This year we're now entering our second, and very challenging phase, focusing on industrialization.

Progress in Vietnam

For us, it means continuing to build our presence, team, and operations in Vietnam, deepening our ties with the Gia Lai region, and showcasing what our next steps in the plant roll-out would entail, as well as preparing for the related financing. In the last year, we've had three meetings with Vietnam's Prime Minister, showing that the support in making Vietnam a global hub for circular textiles couldn't be stronger.

Feedstock partnerships to build ecosystem

We're also mapping - in great detail - the feedstock sources and partners to work with in the supply chain, and preparing for our upcoming multi-ton trials and relations with spinners and fabric manufacturers. This naturally ties into our partners across apparel, automotive, and home interior brands, creating more opportunities along the textile value chain. By making a true drop-in product, we turn circular polyester into a broader business opportunity, especially given the huge supply-demand gap we see in the years to come.

As for our feedstock partners, we recognise the work ahead of us together - establishing greatly needed roadmaps for collectors and sorters out there and taking steps from a grey, informal, work area into bigger transparency and appropriate work conditions.

This is infrastructure that doesn't really exist when it comes to polyester, which is why we wish to be part of building this ecosystem.

Technology to enable speed and scale

We are also establishing our chosen technology paths covering all stages: from pre-processing, depolymerisation, purification to polymerisation, resulting in circular PET chips. Already, we've moved to multi-ton production and met the quality criteria for everything from seat upholstery in a car to performance apparel.

Industrialisation is not a moment. It is a series of decisions that either accelerate or slow down the journey to scale. We have made several of those decisions, and in early 2026 announced some key partnerships to enable true industrialisation.

Industrial partnerships building the ecosystem needed

We are teaming up with long-term industry innovator *Jeplan* and automation giant ABB, moving from strategic collaborations to actual operations.

ABB will use Syre as a testbench and partner to unlock a business area that brings their deep expertise from pulp and paper into fibre and textiles. For Jeplan, we will optimise our business by co-developing areas like valorisation of by-products, while leveraging their access to a larger-scale demo facility in Southern Japan.

This marks a shift for us: we are now building up and leveraging global units of operations and existing facilities to scale our tech.

As a scale-up, not all routes are clear from the beginning. We have found one route to industrialisation but will always be agile enough to shift track when another, faster one is found. Our main promise will always be speed and scale to market. The planet cannot afford to wait.

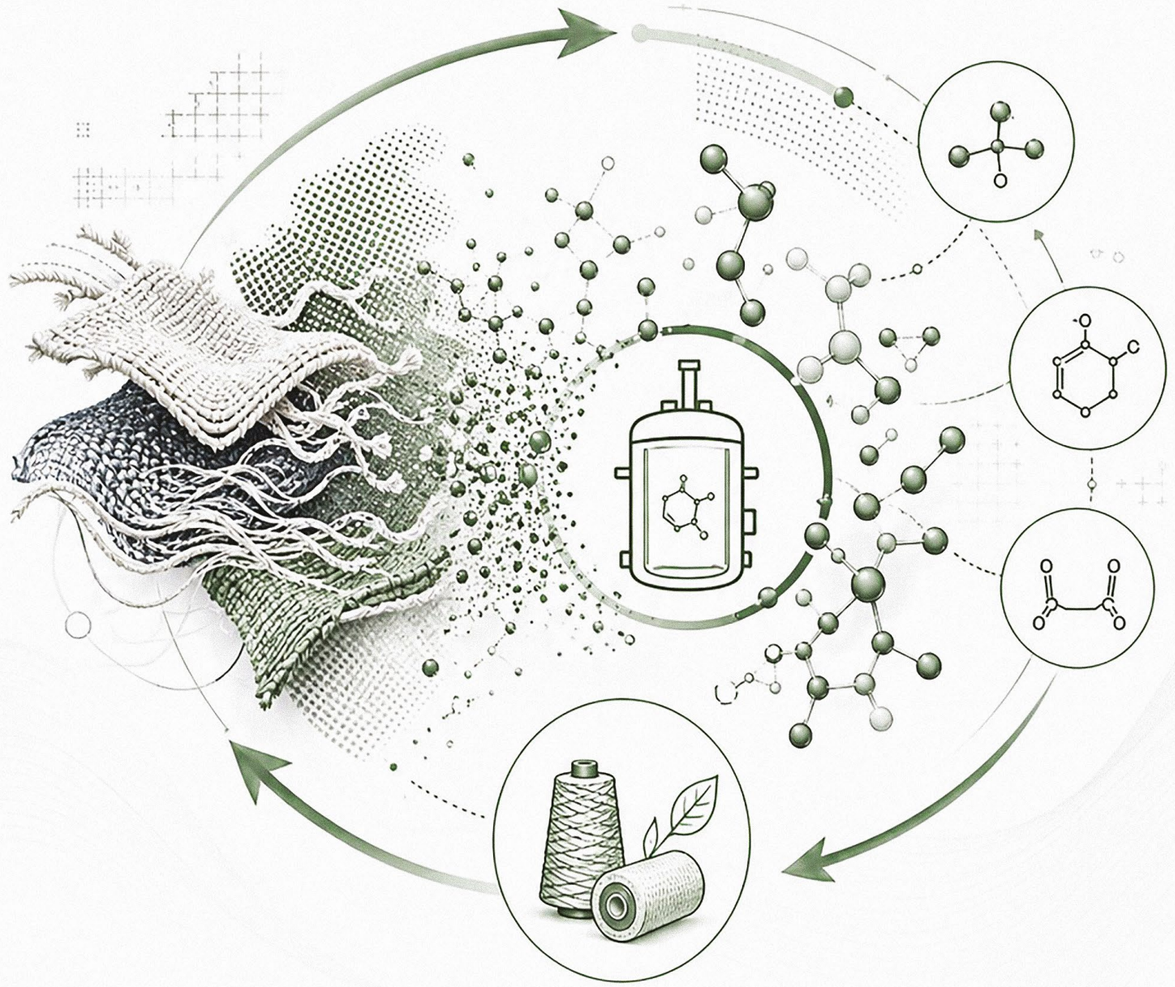
More to come! Remember, impact is never done alone.



***JEPLAN** – The Syre team visiting Jeplan in Japan. Jeplan's PET chemical recycling plant for textiles in Kitakyushu is a key site where Syre's technology will be tested and scaled.*

CHAPTER 5

CHEMICAL RECYCLING





Chemical recycling is where fashion has pinned a lot of its hopes. It's also where some of the industry's most ambitious promises have run into the hardest realities.

That tension exists because the underlying idea isn't just hype. Chemical recycling genuinely offers something mechanical processes can't: a way to get value out of the messy, mixed-fibre waste that makes up most of what the fashion industry throws away. Blended fabrics, polyester-heavy textiles, the stuff that can't be shredded and respun - chemical recycling is, at least in theory, how you deal with it. Fashion for Good has argued it gives the industry a real shot at tackling its waste problem at scale.

The field has also matured enough that grouping everything under one label is starting to look short-sighted. Textile Exchange's April 2026 Materials Matter policy drew clear lines between dissolution, solvent-based purification or separation, and chemical depolymerisation, a sign that the industry is finally treating these as distinct technologies rather than variations on the same idea.

And they are genuinely different. Some companies are working with cotton-rich waste, breaking it down into dissolving pulp or fibres that can feed into new cellulosic fabric production. Others are focused entirely on polyester, using depolymerisation to crack textile waste back into the monomers and polymers that go into making new polyester. Then there's a third group tackling perhaps the hardest problem of all: poly-cotton blends, which make up a huge share of what people actually wear and discard, but which are fiendishly difficult to separate cleanly into their component parts.

The Textile Exchange framework spells out what each route actually produces: dissolution gives you pulp, staple fibre or filament; solvent-based processes yield recycled polymers or fibres; depolymerisation takes polyester feedstock and produces monomers, polymers, chips, or fibre. Different inputs, different chemistry, different outputs.

The broader conversation hasn't always kept up. A business recovering cellulose from old cotton shirts is doing something fundamentally different from one breaking polyester down into BHET. Separating a polycotton blend into its constituent fibres is not the same as repolymerising recycled chips into new material. Treating them as roughly the same thing (as the industry sometimes still does) makes it harder to judge what's actually working and what isn't.

WHY CHEMICAL RECYCLING HAS ATTRACTED SO MUCH ATTENTION

The modern textile waste stream is dominated by materials that are hard to recycle mechanically at high value; polyester above all, followed by blended and low-quality garments with mixed inputs. Any process that can recover near-virgin outputs from those waste streams has obvious appeal, which is why chemical recycling has attracted substantial capital, brand partnerships and policy interest over the past several years.

But that same promise has created a credibility problem. The segment has been discussed as if scale were imminent for years. In reality, most of that time has been spent moving through pilots, demonstration units, engineering phases and early industrial build-out, with only a limited number of genuinely large-scale operating assets to show for it. A pilot is nothing like a plant, a successful trial is not a commercial business and site announcement is not the same as steady output.

The sector has already learned that lesson the hard way. Reuters noted in February 2026 that the industry has often struggled to gain traction, pointing to the 2024 bankruptcy of Renewcell (whose assets later re-emerged under Circulose ownership) as a reminder that promising technology alone is not enough. Circ, in its own account of supply-chain scaling, referred to the innovation “valley of death” that has trapped startups in this space and cited Renewcell as an example of how difficult offtake and commercial rollout can be even when a technology achieves genuine visibility.

While the segment is no longer hypothetical, it is certainly passing through a harsh stage of industrial selection, where it looks likely that only a limited number of players will reach real scale.

CIRCULOSE AND THE EFFORT TO RECOVER COTTON-RICH WASTE

Circulose is one of the clearest illustrations of both the promise and fragility of chemical textile recycling. Circulose produces a raw material made from 100 per cent recycled cotton textiles and positions itself around value-chain integration rather than a single conversion step.

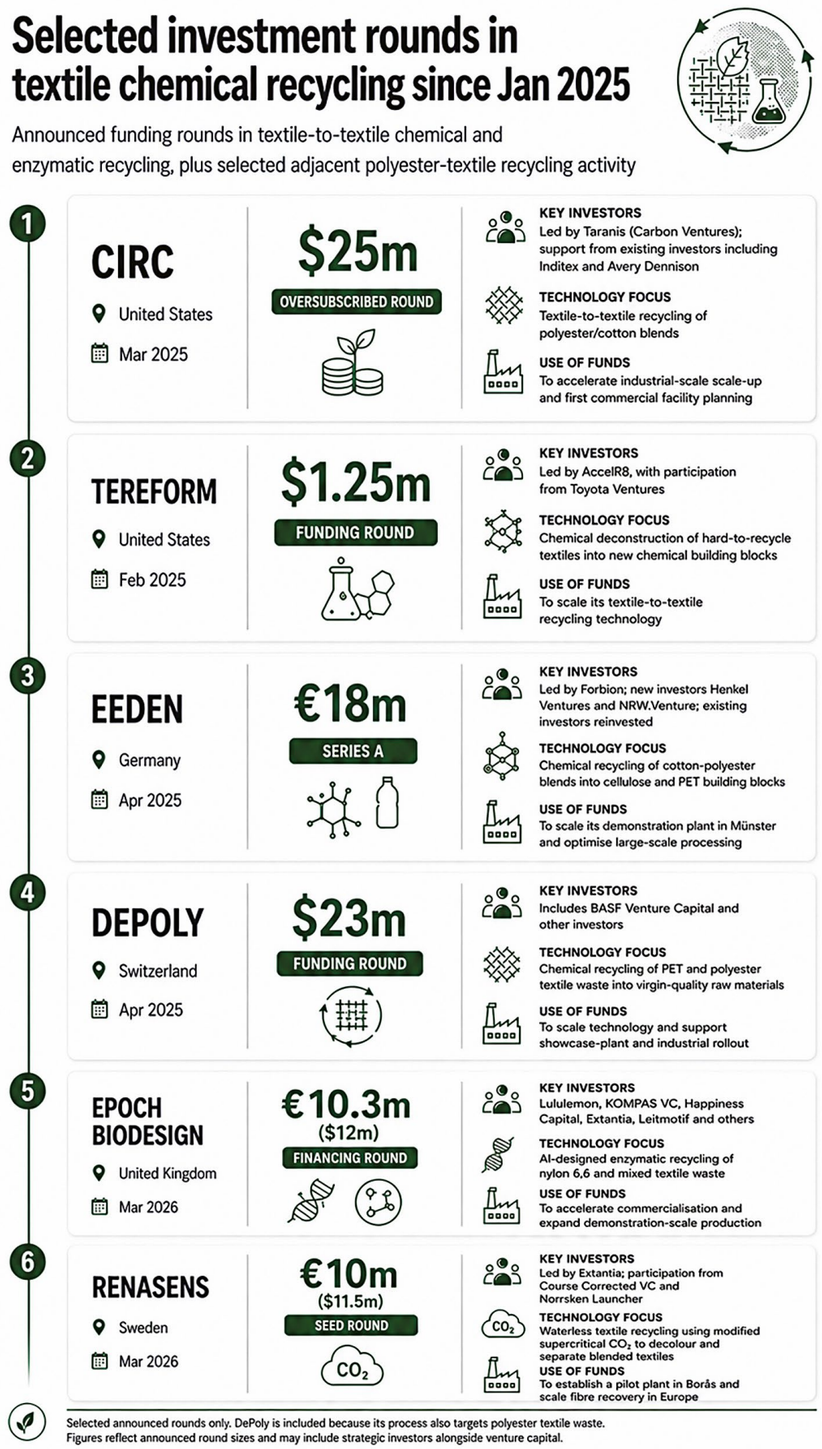
The company claims its Ortviken plant in Sundsvall, Sweden is the world's first commercial-scale chemical textile-to-textile recycling facility and announced in February 2026 that it was set to restart commercial-scale production there.

Its history is also a reminder that technical progress does not eliminate commercial risk. The business emerged after Renewcell's 2024 bankruptcy, which became one of the sector's defining cautionary tales. That episode showed how exposed chemical recyclers remain to brand commitments, financing conditions and the health of downstream markets. A strong process and a high-profile plant are not enough if the commercial chain around them is weak (Renewcell was let down by at least one major client).

POLYESTER DEPOLYMERISATION

On the polyester side, at the time of writing, Reju is rapidly emerging as one of the more prominent names. Its model centres on turning post-consumer polyester-rich textile waste into rBHET, which is then repolymerised into Reju PET. In February 2026 the company announced Lacq in France as the site for an industrial-sized regeneration hub, saying the plant would use its proprietary depolymerisation

> „ While the segment is no longer hypothetical, it is certainly passing through a harsh stage of industrial selection, where it looks likely that only a limited number of players will reach real scale ”



technology to transform post-consumer textiles into rBHET for new polyester production. Reju had already selected Chemelot in the Netherlands for a similar hub in May 2025 and opened Regeneration Hub Zero in Frankfurt in October 2024.

What distinguishes Reju from many others in the space is that it is trying to build an infrastructure, not just prove or develop a process. Its announcements centre on hubs, traceability and system-building rather than technology alone.

Polyester is easily the largest fibre category in the market, so any serious attempt to push textile-to-textile recycling beyond marginal volumes must confront it. However, doing so means securing reliable feedstock, achieving polymer-quality outputs and developing strong downstream conversion.

As of Reju's February 2026 announcement, its French project remained subject to a final investment decision by Technip Energies' board. More evidence that companies are still working through approval, engineering and industrialisation rather than running commercial-scale plants.

POLYCOTTON SEPARATION: WORN AGAIN AND CIRC

With poly-cotton, technical difficulty increases. Combining two dominant fibre types in one garment and then separating them while preserving useful outputs is one of the hardest problems in textile recycling. It is also one of the most commercially important, given how prevalent poly-cotton is in the waste stream (it is the most commen fibre blend). This is a nut the industry surely must crack.

Worn Again Technologies is one of the companies most directly focused on that challenge. In March 2026 it announced the start-up of its Accelerator plant in Winterthur, Switzerland, describing it as the next major step towards commercialising its textile-to-fibre process and proving the technical and economic feasibility of polycotton recycling. The first module recovers polyester; a second, focused on cellulose recovery, was under construction at the time of the announcement.

Worn Again has been around for well over a decade and its lack of ability to commercialise in that time surely cannot be ignored. But it could also be taken as evidence that the company was ahead of the curve on this issue and (like others) will require a more favourable regulatory environment to achieve its long-term goals.

Circ is another key name in poly-cotton, with a slightly different profile. The company positions itself around recovering both polyester and cellulosic outputs from poly-cotton waste and says it is working to bring the world's first industrial-scale poly-cotton recycling plant to life in France. It had completed a French CNDP-supervised public consultation before entering permitting and engineering phases going into 2026.

Its Circ-Ready supply network includes partners such as Selenis, Lenzing, Tangshan Sanyou and Arvind Limited. The company says it is building a global network to close the loop on poly-cotton waste.

That downstream ecosystem focus is strategically important as poly-cotton recycling only becomes commercially relevant when the recovered polyester and cellulose streams can feed real manufacturing pathways. Circ's emphasis on mills, fibre producers and chemical partners reflects that.

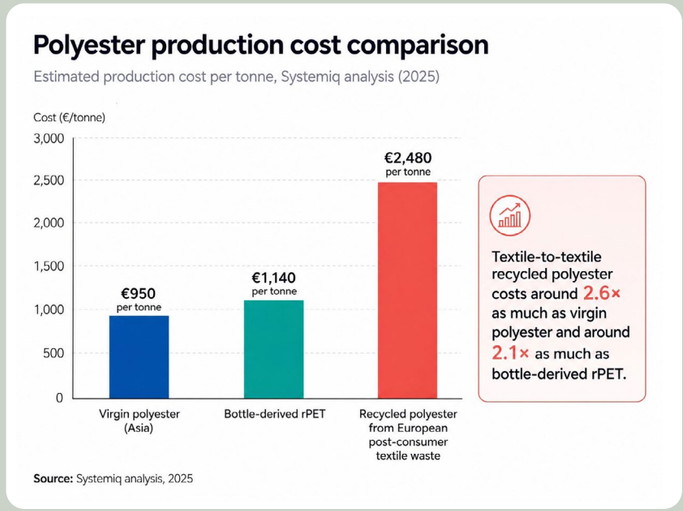
That said, permissions and engineering are signs of progress, not actual operations. The sector has many companies with serious technical credibility and brand attention, but fewer with long-established plants running at scale (that is a description of much of the market, not a criticism of Circ alone).

THE HYPERSCALE POLYESTER PUSH: SYRE

Syre represents a different kind of ambition. Backed by H&M Group and Vargas, the company is making one of the boldest pitches in the segment: textile-to-textile polyester recycling at what it calls hyperscale. The company aims to produce three million metric tonnes of circular polyester by 2032.

The industrial partnerships Syre is assembling give that ambition some serious grounding. In March 2026 Syre announced an MoU with ABB to explore automation, electrification and digital technologies

THE COST GAP



The price difference between virgin polyester, bottle-derived rPET and chemically recycled textile-to-textile polyester is an issue recyclers will need to confront head-on.

Virgin polyester is cheap because it draws on decades of petrochemical scale, low-cost fossil feedstocks, Asian production clusters and highly optimised polymer and fibre infrastructure. Bottle-derived rPET costs more than virgin, but it still benefits from a relatively clean and mature collection stream. PET bottles are standardised, widely collected and already moving through established recycling systems.

Textile-to-textile chemically recycled polyester is beginning from a much weaker position. Its feedstock is fragmented, inconsistent and expensive to prepare. Post-consumer garments vary by fibre blend, colour, finish, trims, elastane content and contamination. Before they can enter a chemical recycling process, they typically need collecting, sorting, fibre identification, pre-processing, shredding and removal of unsuitable components. All of that is on top of the recycling process itself.

Systemiq analysis in 2025 puts the production cost of recycled polyester from European post-consumer textile waste at around €2,480 per tonne, against roughly €950 per tonne for virgin polyester from Asia and around €1,140 per tonne for bottle-derived rPET. On those numbers, textile-to-textile recycled polyester costs approximately 2.6 times as much as virgin and around 2.1 times as much as bottle rPET.

Energy is a factor, but not the decisive one. Chemical recycling is energy-intensive, yet even substantial reductions in industrial energy prices would only narrow the gap modestly. The bigger issue is that textile-to-textile recycling has to fund an entirely new upstream system which bottle recycling largely inherited from existing infrastructure.

Capital costs add another layer. Industrial chemical recycling plants are expensive, first-of-a-kind assets. Investors need confidence that plants will receive sufficient suitable feedstock and that brands will pay a premium for the output over time. Long-term off-take agreements, which some recyclers are signing with major brands, help de-risk projects at the margins. But they do not close the underlying cost gap unless brands are prepared to absorb higher material costs across mainstream ranges, not just limited sustainability lines.

Policy could potentially be decisive in terms of shifting the needle on this issue. EPR fees, recycled-content mandates, public finance, infrastructure support and clearer incentives for textile-derived recycled polyester could all help. But regulation will need to draw a clear distinction between bottle-derived rPET and textile-derived rPET. Without that, brands will continue meeting recycled-content targets through cheaper bottle feedstock, leaving textile-to-textile recyclers without the demand base they need to justify scale.

for its first recycling plant, to be built in Vietnam with construction targeted from 2027. It also announced a strategic partnership with JEPLAN, aimed at refining solutions for large commercial scale and targeting multi-tonne volumes of textile-to-textile polyester for spinning validation and product samples with brands in late 2026.

JEPLAN's involvement is particularly relevant. It brings years of chemical recycling and plant experience in Japan, including textile-related PET recycling capability, to a company that wants to move fast globally. The partnership signals that Syre understands ambition only matters if process expertise, automation and operating readiness are behind it.

THE CONSISTENT PROBLEMS

For all the activity, chemical recycling faces a remarkably persistent set of difficulties.

Feedstock remains the first. Chemical recyclers are just as dependent on upstream systems as mechanical recyclers. Fashion for Good launched Project FAE in April 2026 precisely because non-re-wearable post-consumer textiles are still not being sorted and pre-processed well enough to create viable recycler-ready feedstock at scale. The idea that clever chemistry can compensate for weak upstream systems is wrong. Poor feedstock raises preparation costs, complicates processing and undermines output consistency.

Commercial readiness is the second. Proving a process in pilots is not the same as building a viable business. Chemical recycling start-ups need long-term financing, patient industrial backing, brand off-take that actually holds legal water and a realistic path to cost competitiveness.

The Renewcell bankruptcy remains the clearest illustration of what happens when those conditions are not in place.

Demand is the third. Recycling Europe warned in January 2026 that the European textile collecting, sorting and recycling industry is under severe pressure from oversupply of low-quality waste, insufficient demand for recycled textile fibres and funding gaps, and argued that mandatory recycled content rules are needed to stimulate demand structurally. However strong a process may be, it depends on a market willing to buy the output at meaningful volumes.



The fashion industry, as we have written many times before, is extraordinarily price-sensitive. Recycled options must be able to compete with virgin materials on price, which is a huge ask (and hence the importance of recycled content rules which, if introduced properly, we believe could be a genuine game-changer).

THE STATE OF PLAY

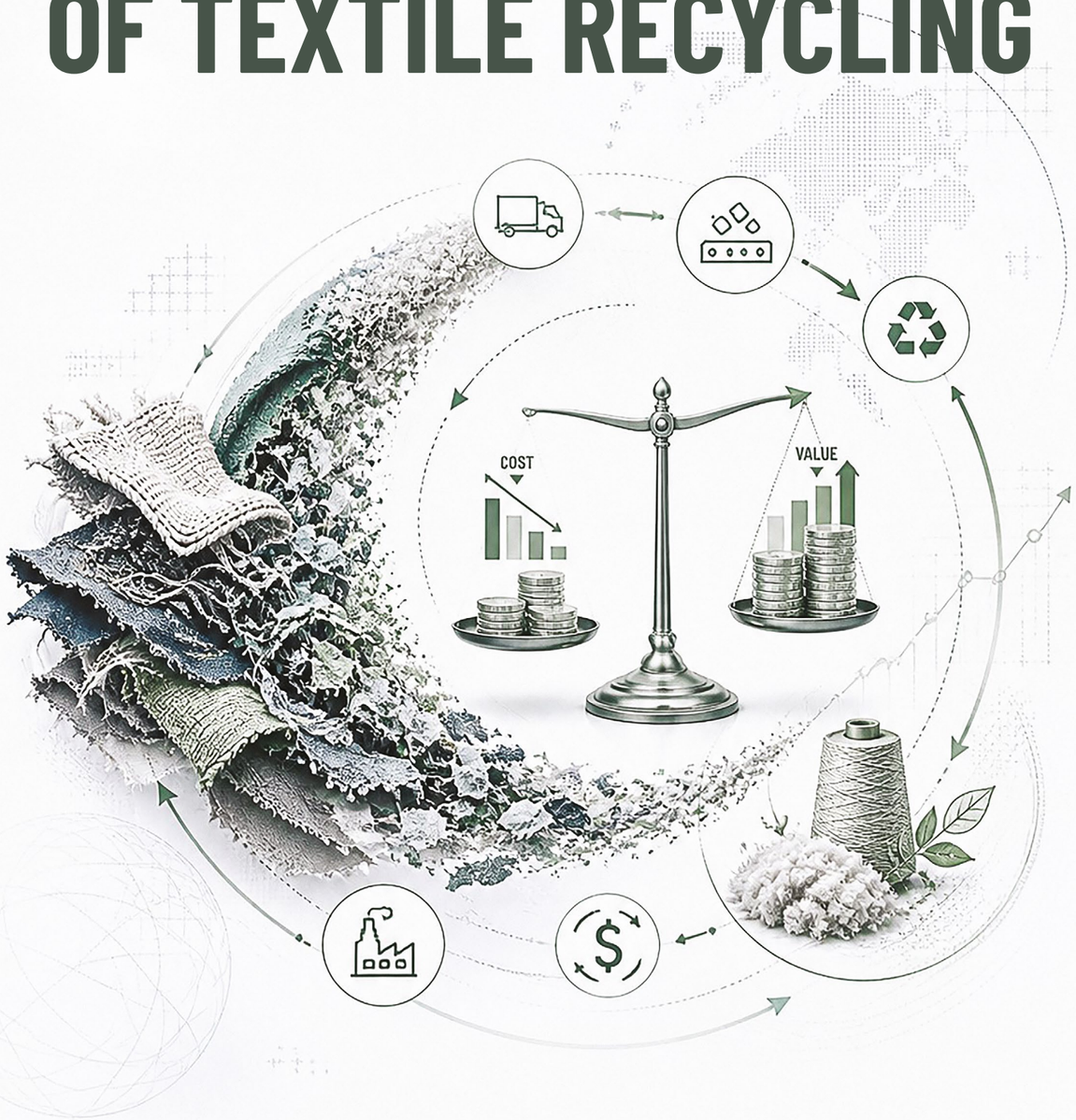
Chemical recycling in 2026 has moved beyond lab-stage promises, even if it has not yet delivered on the scale its backers have long projected. The companies covered here are not a comprehensive list (similar projects are emerging across multiple geographies) but they give a reasonable picture of where the more visible activity sits: a restarted commercial-scale cellulosic plant in Sweden, Reju's expanding set of polyester depolymerisation hubs, Worn Again's poly-cotton separation Accelerator, Circ's industrial-scale France project working through permitting, and Syre's hyperscale polyester ambitions backed by serious industrial partners.

The direction is clear. Whether the infrastructure catches up with the ambition is the question the next few years will answer.

But the sector is still feedstock-constrained, capital-intensive and vulnerable to weak off-take and thin downstream demand. It contains companies at very different stages, from operating commercial assets to engineering-phase projects to fast-moving industrialisation plays. The chemistry has (arguably) reached maturity, but the industrial system around it is still being built, and that gap between the two is where most of the risk sits.

CHAPTER 6

THE ECONOMICS OF TEXTILE RECYCLING



Textile recycling is entering a difficult (arguably the most challenging) phase. The early story was about proving that old fibres could be recovered and reused. The next stage is about whether the surrounding economics can support that recovery at scale.

That means looking beyond the plant gate. Used textiles have to be collected, moved, sorted, identified, cleaned, de-trimmed, pre-processed and delivered to a recycler at a cost that makes commercial sense. The recovered material then has to compete against cheap virgin fibres, against bottle-derived rPET, against whatever is currently easier to buy. If it cannot compete on price, someone has to make up the difference.

The value chain will surely only scale when each stage in it has a viable economic role. Right now, that is not the situation.

While the sector is not short of textile waste, it is short of is affordable, consistent, recycler-ready feedstock. A tonne of mixed post-consumer clothing and a tonne of usable cotton-rich or polyester-rich recycling input are not the same thing. Getting from one to the other involves a long chain of cost.

As set out earlier in this report, textile recycling infrastructure is not just the recycling plant. It spans collection, consolidation, sorting, fibre identification, pre-processing, logistics, traceability, recycling capacity and downstream demand.

By the time material reaches a recycler, most of the financial battle has already been won or lost upstream.

WASTE VOLUME IS NOT FEEDSTOCK

Textile waste is not a uniform commodity. It is a low-value, inconsistent, heterogeneous stream, with different fibres, colours, constructions, finishes, trims and levels of contamination. Some items are fit for reuse. Some can be downcycled. Some lend themselves to mechanical recycling. A fraction might be suitable for chemical recycling.

A meaningful share is too dirty, too degraded, too complex or simply too expensive to process in any useful way.

This is the feedstock problem.

The question that matters for a recycler is not how much textile waste exists in aggregate but how much of it can be supplied to the right specification, at the right price, in the right volume and with enough consistency to run a viable operation.

The economics deteriorate further because the most recyclable material is rarely the cheapest. Clean, homogeneous, pre-consumer waste has value precisely because it is easier to work with. Mixed post-consumer clothing is abundant, but converting it into usable feedstock means sorting, testing, de-trimming and pre-processing, all before recycling has started. Each of those steps adds cost.

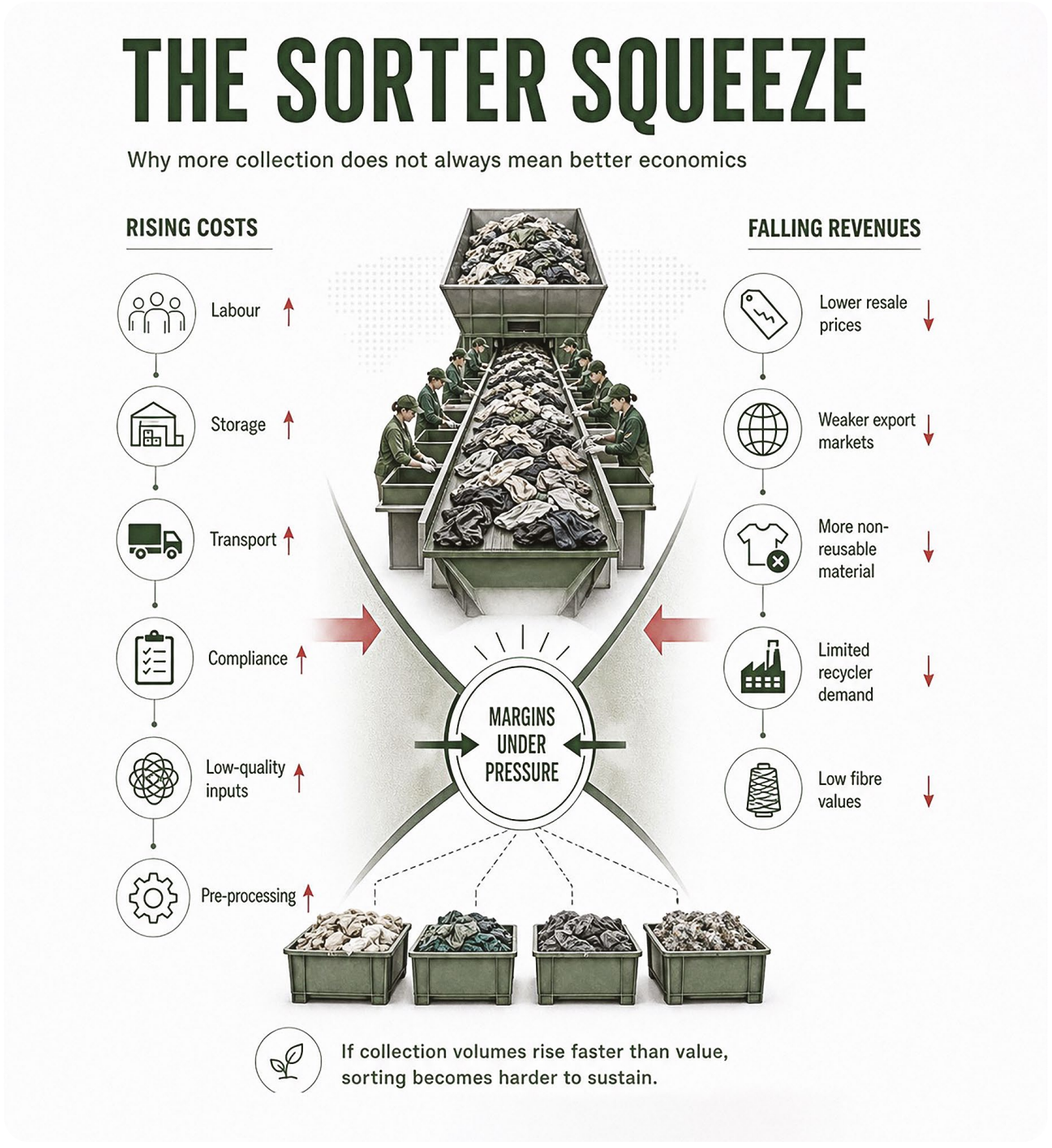
In a nutshell: the cheapest textile waste is rarely the most recyclable while most recyclable textile waste is rarely cheap.

THE COST STACK

Collection is where the cost base starts. Bring banks, charity shops, brand take-back schemes, municipal collections and kerbside systems all require labour, vehicles, sites, containers, contracts, communications and handling. None of it is free.

Consolidation comes next. Used textiles are bulky and relatively light. They are expensive to transport relative to their value, and they often arrive wet, mixed or contaminated.

Then comes sorting, historically the sector's com-



mercial engine, but not one built with recycling in mind. Traditional sorting was designed around reuse and resale, grading garments by quality, category, season, gender, style, destination market. Producing recycler-ready feedstock requires a different kind of separation.

A recycler does not want necessarily "old clothes." It may need white cotton above a defined purity threshold, or polyester-rich material with limited elastane. It may need cellulosic feedstock free of coatings or heavy prints, within a narrow blend range, with moisture and contamination controls.

Fibre identification is another cost, including near-infrared sorting, AI-assisted systems, composition testing, colour sorting, verification tools. These improve feedstock quality, but they carry capital costs and operating costs. They reduce labour in some places, but they do not eliminate the need for infrastructure investment.

Pre-processing then adds another layer. Buttons, zips, rivets, labels, linings, elastic, coatings, printed areas - all may need to be removed or managed. French work produced for Refashion found that 78 per cent of textile items had at least one external recycling disruptor made of metal, plastic, fabric or another material.

Only then does material reach the recycling process itself. Mechanical recycling brings costs around cutting, tearing, opening, dust control, fibre loss, blending and spinning. Chemical recycling brings energy, chemicals, solvents, reactors, purification, wastewater management, process control, permitting, capital expenditure and yield loss.

Go downstream, and recovered fibre, pulp, polymer or monomer needs to become something the market will actually buy. This can mean spinning, extrusion, pelletising, fibre production, yarn development, fabric trials, certification and brand approval processes.

THE REVENUE STACK

The revenue side is thinner and harder to predict.

Reuse remains the highest-value route for a large share of collected textiles. A wearable garment is worth more than the fibre in it, and for decades that premium helped cross-subsidise the economics of collection and sorting. Better items covered the cost of handling worse ones.

But that model is under real pressure now. Ultra-fast fashion, falling garment quality, market saturation, weaker export prices and shifting consumer behaviour have all eaten into the reuse economy. When the resale fraction loses value, sorting margins are compressed. The industry has been watching this story play-out for a decade.

Downcycling offers another outlet, including industrial wipes, insulation, mattress filling, acoustic products, automotive materials, nonwovens, low-grade fibre. These markets are real and should not be dismissed, but they do not necessarily support the kind of value implied by some textile-to-textile circularity claims.

> „ Finally, if policymakers mandate more collection without funding treatment, the burden lands on operators already running on thin margins ”

Other revenue streams are still taking shape. EPR payments could support collection, sorting and treatment, while gate fees could become relevant if textile waste is treated more like other industrial waste streams. Brand offtake agreements can underpin investment, but voluntary commitments are not always legally binding (and this is a huge problem).

The strongest potential revenue lever is policy-driven demand. Mandatory recycled-content rules would change the market structurally, because brands would have no choice but to buy recycled inputs rather than simply express interest in them. That would give recyclers, sorters and investors something to actually build against.

Without that, the sector remains exposed as it is left trying to build an expensive supply chain for materials that most buyers will only purchase when they are cost-competitive with virgin alternatives.

THE SORTER SQUEEZE

Economic pressure concentrates most visibly in sorting.

Sorting operators sit in the middle of the chain, between collection on one side and reuse, export, recycling or disposal on the other. They absorb the messy reality of the waste stream, carrying the costs of labour, sites, storage, compliance and logistics.

In October 2024, EuRIC and Municipal Waste Europe warned of a crisis in Europe's textile sorting and recycling sector, with prices for sorted second-hand garments having fallen to the point where they no

longer covered processing costs. Pressure on major operators (Soex, Texaid, and Le Relais among them) has been widely reported, and France has required emergency intervention to keep its collection and sorting capacity functioning.

The economic challenge here is fairly straightforward. If incoming material quality drops, sorting takes longer and yields less. If export markets weaken, lower-grade items pile up. If storage fills, costs climb.

Finally, if policymakers mandate more collection without funding treatment, the burden lands on operators already running on thin margins. Separate collection can therefore make the economics worse (if it increases volume without increasing value).

There is an argument that the whole system requires better financing, because mandating collection without developing sorting, pre-processing and end markets does not advance circularity. It simply creates a larger bottleneck.

France is the clearest warning available. It has one of the most developed textile EPR systems in Europe, and it has still needed major intervention, with support for collection reaching €268 per tonne by February 2026.

THE FEEDSTOCK PARADOX

Recyclers need low-cost feedstock but producing reliable feedstock is costly.

That is the feedstock paradox, and it does not have an easy resolution.

Mechanical recyclers need relatively clean, homogeneous streams. Cotton, wool and acrylic-rich materials can work well when properly sorted and prepared. But fibre damage, colour variation, elastane content, coatings and contamination all reduce output quality. The more complex the input, the lower the likely value of what comes out.

Chemical recyclers have different tolerances, but face the same underlying constraint. A polyester depolymerisation plant still needs a defined polyester-rich stream. A cellulose dissolution route still needs suitable cotton or cellulosic feedstock. A poly-cotton separation process still has limits around contaminants, finishes, elastane and blend complexity.

There is a tendency in some parts of the industry to treat chemical recycling as a catch-all for material that mechanical recycling cannot handle. But chemical routes only extend the range of technically recoverable material, but they do not eliminate the need for disciplined feedstock preparation.

In simply economic terms, the more exact the specification, the more expensive the preparation.

MECHANICAL RECYCLING ECONOMICS

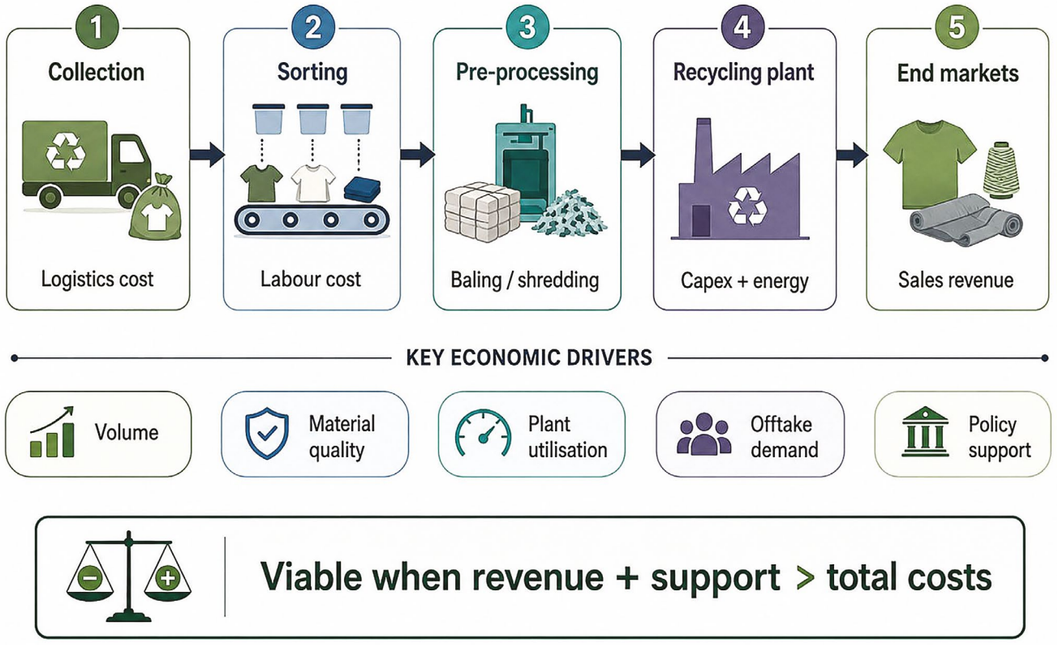
Mechanical recycling has the most developed commercial base in the sector. It operates at real volumes today. It is established in regions with textile manufacturing, sorting labour, open-end spinning capacity, non-woven production or recycled-yarn markets. Relative to most chemical routes, it is less capital-intensive and better understood.

Its economics work best when feedstock is clean, sorted and geographically close to downstream users. Cotton-rich and wool-rich streams are the clearest examples. Pre-consumer waste performs better than mixed post-consumer clothing because it is cleaner, more consistent and easier to identify.

But there are limits. Mechanical processing shortens fibres and reduces yarn strength, while recycled fibres typically need to be blended with virgin or longer-fibre inputs to meet performance requirements. That constrains both end-product value and achievable recycled-content levels.

Mechanical recycling can be commercially meaningful, particularly for cotton, wool, nonwovens, insulation, wipes and mid-value textile applications. But this does not resolve the challenge of mixed post-consumer clothing at any meaningful scale.

Its business case will continue to depend on alignment between feedstock quality, processing cost, local manufacturing capacity and end-market requirements.



CHEMICAL RECYCLING ECONOMICS

Chemical recycling draws investment interest because it promises higher-value recovery from harder-to-recycle streams (blended textiles, polyester-heavy material) and outputs closer to virgin quality.

However, chemical recycling projects tend to be capital-intensive, with larger plants, more complex engineering, tighter process control, significant energy and chemical inputs, permitting requirements, purification systems and extended commissioning periods. To work commercially, they need high utilisation rates, reliable feedstock supply, stable offtake and patient capital.

As noted previously, polyester illustrates the challenge quite clearly. Systemiq's 2025 analysis estimated the average production cost of recycled polyester from European post-consumer textile waste at around €2,480 per tonne, against a long-run average cost of virgin polyester from Asia of around €950 per tonne.

That is the commercial wall the sector is up against. While the policy direction is strengthening, the price benchmark is still set by cheap virgin material.

EPR: SUBSIDY OR SYSTEM BUILDER?

EPR is frequently offered as the answer to the sector's economics. Our take is that it may be part of the answer, but only if it is designed with genuine intent.

EPR cannot simply be collection subsidy, whereby producers pay into a fund that keeps material moving.

A more purposeful model uses EPR as a steering mechanism, seeing fees that reward durable, repairable, recyclable products and penalise difficult

blends, poor-quality design or constructions that create end-of-life costs.

The most effective model treats EPR as infrastructure finance, with capital directed at the weakest links: advanced sorting, fibre identification, de-trimming, pre-processing, traceability systems, recycler-ready feedstock hubs, end-market development.

Poorly designed EPR can increase formal collection while leaving sorters with more low-value material and recyclers with feedstock they still cannot use.



Well-designed EPR (and this is where serious industry input is an absolute necessity) can bridge the gap between waste handling cost and feedstock value.

DEMAND IS THE MISSING LEVER

Recyclers cannot invest confidently without knowing whether brands will buy the output. Sorters cannot justify investment in higher-quality feedstock preparation if there is no reliable premium attached to better fractions. Investors cannot finance plants on the basis of sustainability commitments that are voluntary, vague and not always honoured.

Mandatory recycled-content rules would change the structural logic, creating demand where voluntary commitments have proven insufficient. They would also help close the cost gap between recycled material and virgin fibre by forcing the market to genuinely value recovered inputs.

But the design matters. Targets would need to be fibre-specific and realistic. Policymakers would need to decide whether bottle-derived rPET counts towards textile recycled-content targets, or whether the objective is specifically textile-to-textile recovery. Pre-consumer and post-consumer content would need to be distinguished. Verification and chain-of-custody requirements would need teeth.

Targets that run ahead of available feedstock would potentially cause price spikes or weak claims. But targets that are too loose would fail to shift investment behaviour.

Even so, demand-side policy is likely to be decisive. EPR can help finance the waste side. Recycled-content rules can help create the market side, but need to work together.

WHAT WOULD MAKE THE ECONOMICS WORK?

The economics improve when a system is designed backwards from the recycler's specification, rather than forwards from whatever happens to have been collected.

That means better collection, it means sorting infrastructure that separates material by value and technical suitability, it means pre-processing hubs capable of removing disruptors and producing consistent feedstock, it means fibre identification systems that give recyclers genuine confidence in their inputs and it means end-of-waste clarity, traceability and quality standards that are enforceable in practice.

It also means long-term contracts throughout the chain. Feedstock suppliers need confidence that recyclers will take prepared material while recyclers need confidence that brands will buy outputs. Investors need confidence that policy will help sustain demand.

The most viable systems will likely need to combine several elements at once. This might mean EPR funding for collection and sorting, recycled-content rules to create demand, public or blended finance for infrastructure, brand off-take agreements and design rules that reduce end-of-life processing costs.

The sector has spent years asking whether textile recycling technology can work but now the more pressing question is whether (and how) the economics around it can work.

Right now, the economics remain stubbornly difficult. Collection costs are high, sorting margins are thin and pre-processing infrastructure is still nowhere near the scale the industry needs. Recyclers are caught between demanding feedstock specifications and chronic competition from cheap virgin fibre, while brand demand has yet to reach the consistency that would justify serious capital commitment. Policy ambition, welcome as it is, has moved faster than the infrastructure required to deliver on it.

What the sector still lacks, then, is commercial viability at each stage of the chain simultaneously, with every link strong enough to support the next.

But that is also what makes the current moment genuinely interesting. The problems are well understood, the investment case is sharpening and there is growing alignment between regulators, brands and recyclers on what needs to happen. Closing the loop on textile recycling was never going to be straightforward, but the direction of travel is clear and the pace is picking up.

WHY THE ECONOMICS OF CIRCULARITY ARE UNDENIABLE

By **Paul Riley**, *founder & CEO, Samsara Eco*



Supply chain disruption is no longer a distant threat. Instability in the Strait of Hormuz has once again exposed how dependent the textile industry remains on volatile raw material flows, and the cost of that dependency is rising. For brands operating on tightening margins, the economic case for a fundamentally different materials strategy has never been stronger – and that strategy starts with circularity.

For decades, the textile industry has operated on a linear model: take finite resources, make products, use them briefly, then dispose of them. It delivered scale and affordability, but created enormous waste, resource dependency, and supply chain fragility. As those vulnerabilities become increasingly visible – in volatile raw material prices, stretched supply chains, and growing regulatory pressure – the time for a different approach that prioritises circularity, is now.

Material value

In a circular world, materials have real value. They're no longer a disposable asset but a valuable resource that continues long after its first life. Once a garment is worn out and it can't be resold or repaired, it's recycled and regenerated into a new textile product. The cycle continues, creating a closed-loop system for textiles and displacing the need for virgin materials.

But for recycled materials to become the preferred fibre, these materials can't require brands to compromise – on quality, performance, design or existing supply chains. Performance of recycled materials aiming to replace virgin at scale has historically been a critical limitation, contributing to less than 1 per cent of textiles being recycled back into new textiles at end of life. But new technology is helping change this.

The technology is scaling

At Samsara Eco, we use AI to engineer enzymes that break down end-of-life textiles, including difficult blended and mixed-material waste streams, into their original molecular building blocks. Colours, dyes, additives, chemicals, and impurities are removed in the process, leaving behind pure, virgin-identical materials with a low carbon footprint. Our current focus is nylon 6,6 – one of the most performance-critical fibres in apparel and activewear, and historically one of the hardest to find a recycled solve for without quality loss.

But by breaking materials down to the molecular level, we eliminate the quality compromise that has long held recycled textiles back. Now brands like Australian athleisure brand, LSKD are transitioning from virgin polyester and nylon 6 to recycled nylon 6,6 – the perfect example of the potential of recycled materials where there is no compromise on performance.

Our scale-up plant in Australia is already producing virgin-identical recycled materials that will go into our partners' commercial products, and our dedicated circular nylon 6,6 plant will open in 2028 further increasing capacity at scale.

The brand imperative

But recycled materials alone won't close the loop. The ecosystem around it must develop too. While the volume of post-industrial and post-consumer waste is not scarce, the infrastructure to collect and sort is still being built. But as the infrastructure develops and brands make real commitments to circular models including selecting textile-to-textile recycled materials, and building in end-of-life pathways, circularity will become the norm not the exception. And in doing so for brands, they secure their material supply, reduce exposure to virgin price volatility, and build a more resilient industry.

First-movers are already making significant commitments. Our partners including lululemon, LSKD, and our Nylon Materials Collective collaborators signal exactly this kind of long-term thinking.

And soon, regulation will make circular practices mandatory for all. EPR schemes, minimum recycled content requirements, and Digital Passports are incoming in the EU and will impact every brand with a global supply chain. Critically, EPR means brands will be held accountable for the full life of the products they make, creating a powerful incentive to build in end-of-life pathways from the outset.

Brands that act now will secure early access, reduce supply risk, and build competitive advantage before compliance becomes mandatory.

CHAPTER 7

WHAT GOVERNMENTS TOLD US



While putting together this report, we reached out to governments around the world to ask how they are supporting textile recycling infrastructure.
The picture that emerges across these responses is a sector moving from voluntary ambition towards formal policy, albeit at very uneven speeds.
The strongest thread across Europe is mandatory separate collection and extended producer responsibility. Ireland, Romania and Poland all point to the revised EU Waste Framework Directive as the central driver, with EPR schemes moving from concept to legislative timetable. Germany is preparing its own national textile legislation, while the European Commission has identified textiles as a priority sector.
But collection is only the first step, as several countries point out. Poland, Romania and California all flag sorting capacity, reuse infrastructure, recycling technology and traceability as the real priorities. More textile waste is entering formal systems but infrastructure to handle it is not keeping pace.
California stands out for the specificity of its approach. The Responsible Textile Recovery Act creates the first mandatory statewide EPR programme for textiles in the United States, requiring producers to fund and operate collection, repair, reuse and recycling. The approval of Landbell USA as the first producer responsibility organisation moves it from policy into implementation.
Switzerland already has a mature, privately run collection system handling around 60,000 tonnes a year, yet rising volumes of poor-quality textiles are straining a model built around reuse and charitable collection. FabricLoop represents an attempt at an industry-wide solution.
Canada is approaching textile waste increasingly through the lens of plastics and microfibre pollution. Its Federal Plastics Registry will gather data on plastics in textiles and their end-of-life fate. The figure it cites is worth noting: around 98 percent of plastic textile waste currently goes to landfill!
Pakistan's response reflects the position of a major producing country facing rising expectations from export markets. Its focus on cleaner production and regulatory strengthening shows that textile recycling policy is no longer only a post-consumer issue in importing economies. For producing countries, it is becoming a question of competitiveness and market access.
Taken together, these responses suggest Governments are accepting that voluntary systems and informal reuse markets are not enough. The future will be shaped by producer responsibility, better data and serious investment in sorting and recycling capacity. But most countries are still preparing legislation, running pilots or assessing what infrastructure they actually need. The gap between policy ambition and operational reality remains wide.

PAKISTAN (responses from a spokesperson for the Ministry of Climate Change and Environmental Coordination)

What is your Government currently doing to improve textile collection, sorting, re-use and recycling infrastructure?
Pakistan's textile sector, being the backbone of the country's exports and industrial employment, is gradually moving towards more sustainable and circular production practices. The Government of Pakistan is working closely with industry stakeholders, development partners, and provincial authorities to improve textile waste management, promote resource efficiency, and encourage environmentally responsible manufacturing.
Efforts are under way to support better collection, sorting, re-use, and recycling of textile waste, particularly through cleaner production initiatives and increased awareness of circular economy approaches within the textile value chain
Are there any specific policies, funding programs, EPR schemes, pilots or public-private initiatives under way?
In recent years, Pakistan has initiated policy discussions and collaborative programmes focused on sustainable textiles, waste reduction, and compliance with evolving international environmental requirements. Public-private partnerships and pilot initiatives are also being encouraged to explore innovative recycling technologies, efficient use of raw materials, and environmentally sound disposal and recovery systems. These efforts are particularly important in light of growing global demand for sustainable and traceable textile products
What are the main priorities for the next 12-24 months?
Over the next 12–24 months, the Government's priority will be to further strengthen the regulatory and institutional framework supporting circularity in the textile sector, facilitate investment in recycling infrastructure, enhance industry capacity to meet international sustainability standards, and promote green industrial growth.
Pakistan also aims to expand collaboration with international partners and the private sector to support sustainable textile production and improve competitiveness in global markets.

SWITZERLAND (responses from a spokesperson for the Federal Office for the Environment)

What is your government currently doing to improve textile collection, sorting, re-use and recycling infrastructure?
Switzerland has operated a well-established textile collection system for many years. Each year, approximately 60,000 tonnes of used textiles (including old clothes, home textiles and shoes) are collected separately, corresponding to around 7 kilograms per inhabitant annually. Further information is available in the report 'Recycling of used textiles in Switzerland' (available in German and French only).
According to the study 'Material Flows of End-of-Life Textiles in Switzerland', around 60 per cent of the textiles collected in Switzerland are still wearable (second-hand clothing) and around 28 per cent are recycled as raw materials. The remaining approximately 12 per cent of collected textiles are disposed of as waste.
The established, privately run Swiss recycling system for used textiles is under threat, partly due to the increase in poor-quality textiles.
At the political level, discussions are ongoing regarding the possible introduction of dedicated textile regulations in Switzerland, including measures to improve textile recycling and circularity. See parliamentary initiative: https://www.parlament.ch/en/ratsbetrieb/suche-curia-vista/geschaeft?AffairId=20263297
Are there any specific policies, funding programmes, EPR schemes, pilots or public-private initiatives under way?
The industry organisation 'FabricLoop' is in the process of developing a voluntary industry-wide solution. This is intended to close the loop on textiles and ensure sustainable financing.
Switzerland's existing textile collection and recycling system is largely operated by private and charitable organizations and does not receive government funding. Major actors include Tell-Tex, TEXAID and Caritas, which collect and manage used textiles across the country. In terms of innovation, Switzerland sees significant development potential in both mechanical and chemical recycling.
What are the main priorities for the next 12–24 months?
The motion tabled by National Councillor Sauter calls for the creation of a new legal basis for establishing an industry-wide solution in the textile sector (https://www.parlament.ch/en/ratsbetrieb/suche-curia-vista/geschaeft?AffairId=20263297)
Parliament has not yet reached a final decision on this proposal.
Furthermore, changes in the market, like the establishment of the new voluntary industry organisation "FabricLoop" (cf. answer 2) are being monitored.

IRELAND

A spokesperson of Ireland's Department of Climate, Energy and the Environment told us: "The Government is taking action to reduce textile waste. Minister Dillon published the National Policy Statement and Roadmap on Circular Textiles 2026-2028 on 2 April 2026 which sets out for the first time a policy direction for Ireland regarding the prevention and management of textile waste, available at https://www.gov.ie/en/department-of-climate-energy-and-the-environment/publications/national-poli-

cy-statement-and-roadmap-on-circular-textiles/
The measures proposed in the Roadmap will help curb fast fashion trends, increase reuse and recycling, and significantly reduce the environmental footprint of textiles.
The revised Waste Framework Directive entered into force in October 2025. This provides for a mandatory EPR for textiles. Member States must have an EPR scheme up and running by April 2028 and the Directive must be transposed by June 2027. The Department has begun work on drafting the necessary regulations to transpose the Directive and plans to publish an EPR Delivery Plan for stakeholder consultation at the end of June.
The Department continue to invest in public awareness, including the national 'Reverse the Trend' campaign, which highlights the environmental impact of fast fashion and encourages reuse, repair, swapping and sharing. The Department also funds a national public awareness campaign on post-use textiles to advise citizens on where and how to discard / donate their used textiles responsibly. The Department funds the Relove Fashion competition run by the Rediscovery Centre, engaging schools and youth groups nationwide in sustainable fashion.
In 2022 the Department established the National Textiles Advisory Group. The Group is a multi-stakeholder forum bringing together key actors across the textile value chain to foster knowledge sharing and inform policy responses. Minutes and materials from the Group's meetings are publicly available on gov.ie at this link here: https://www.gov.ie/en/department-of-climate-energy-and-the-environment/publications/textiles-advisory-group/
Together, the revised Waste Framework Directive and Ireland's national policy approach will be gamechanging in curbing fast fashion, boosting reuse and recycling, and reducing the environmental and climate impacts of the textile sector - supporting our transition to a more circular, sustainable economy.

CANADA

A spokesperson from Media Relations Environment and Climate Change Canada told us: "In Canada, approximately 98 per cent of plastic textile waste currently ends up in landfills. According to Statistics Canada's Physical Flow Account for Plastic Material, around 355 kilotonnes of synthetic textile products (polyester, nylon, polyvinyl chloride, or acrylic) were purchased in 2022 and around 296 kilotonnes were discarded. The Government of Canada is implementing an ambitious, science-based and comprehensive plan to reduce plastic pollution and move toward a strong and resilient circular plastics economy.
A key component of this strategy is Canada's Federal Plastics Registry (https://gazette.gc.ca/rp-pr/p1/2024/2024-04-20/html/notice-avis-eng.html) which requires companies, including producers, to report annually on the quantity and types of plastic they manufacture, import, and sell and how it is managed at its end-of-life. This includes collecting data on plastics in textiles, including quantity and their end-of-life management.
Since 2018, the Government of Canada has been working with organisations to advance research on microfibre pollution, and identify opportunities to reduce waste, as well as pilot recycling and waste diversion programs.
Furthermore, since 2022, more than CAN$1m has been invested in projects to develop and implement actions to reduce plastic waste and pollution in the textile and apparel sector.
Examples include:
Canadian-Led Community Reuse Initiatives and Tax Credit Donation Incentivization project (https://nactr.ca/wp-content/uploads/2023/02/NACTR-Reduce-Reuse-Rewear-1.pdf)
The Debranding & Repair Manual (https://designrr.page/?id=525482&token=3982449452&h=5172)
Textile Transformation Nova Scotia Project (https://nactr.ca/textile-transformation-nova-scotia-phase-iproject-report-available/)
In March 2025, following consultations on ways to address plastic waste and pollution in the textile and apparel sector, Environment and Climate Change Canada published a What We Heard Report (https://www.canada.ca/en/environment-climate-change/services/managing-reducing-waste/consultations/roadmap-plastic-waste-pollution-textile-apparel-sector/what-we-heard.html)
Next steps will be shared in due course.

ROMANIA

A spokesperson from Romania's Ministry of Environment, Waters and Forests told us: Romania is currently strengthening the separate collection framework for textile waste, in line with EU waste requirements.
Under Government Emergency Ordinance No. 92/2021 on the waste regime, local public authorities must ensure separate collection for municipal textile waste from 1 January 2025 and provide appropriate collection spaces and containers allowing citizens to discard such waste free of charge.
This obligation is already being implemented at local level, with textile collection systems operational in a number of counties and municipalities, while additional systems are under development.
In practice, collection is organised through a mix of approaches, including dedicated collection containers, civic amenity sites and periodic collection campaigns, depending on local administrative arrangements.
Romania is preparing for the transposition of the revised EU Waste Framework Directive, which will require the establishment of Extended Producer Responsibility (EPR) schemes for textiles within 30 months from its entry into force on 16 October 2025. This will represent a key structural reform of the system.
Priorities for the next 12-24 months include expanding collection coverage, strengthening sorting and preparation for reuse capacity, improving data and traceability of textile waste flows, and preparing the national framework for EPR implementation. Romania is also exploring opportunities under EU funding programmes, including Horizon Europe, to support innovation in textile sorting, reuse and recycling technologies.

GERMANY

A spokesperson for the Federal Ministry for the Environment in Germany told us: In 2024, Germany decided on a National Circular Economy Strategy (NKWS). NKWS intended to make a decisive contribution to reducing environmental impact, protecting biodiversity, and combating climate change. The circular economy and resource conservation can contribute to climate neutrality and decarbonisation.
In key sectors of our economy, the vast majority of emissions are not generated during the production of end products, but rather during the extraction of raw materials and the manufacture of intermediate products. Among the measures planned you will find some that will target challenges within the textile sector that cause significant consequences for the environment.

In March 2026, Federal Environment Minister Carsten Schneider presented key points for a Textile Act designed to address the challenges associated with the disposal of used clothing. In the future, manufacturers will be required to take responsibility for the collection and recycling of used textiles. This will also address the problems stemming from the enormous growth of fast fashion. The industry has currently the opportunity to provide feedback on the key points.
Last but not least, Germany supports the development and establishment of more sustainable textiles with its different funding programs focusing on circular economy.
The best measures against the mass of fast fashion in the European common market are to be found on the European level. The German Ministry for the Environment has thus supported adequate solutions on the European level. The Ecodesign for Sustainable Products Regulation (ESPR) (EU) 2024/1781, which entered into force in 2024 to establish a framework for setting ecodesign requirements for sustainable products, makes it possible for the first time to develop binding requirements for textile products. The goal is to make sustainable textile products the standard in the EU. Starting in July 2026, the EU will introduce a flat customs fee of 3 euros on all low-cost packages (under 150 euros) from non-EU countries such as China (Temu, Shein) to circumvent the 150-euro duty-free threshold. This fee applies per product category. The following already applies: For shipments up to €150, no customs duty is payable, but import sales tax (19%) must be paid.

CALIFORNIA

A spokesperson from CalRecycle, Office of Public Affairs, told us: As part of California's move to a fully circular economy, the world's fourth largest economy is developing the nation's first mandatory extended producer responsibility program (EPR) for textiles and apparel. Californians landfill 1.2 million tons of textiles each year, contributing to climate pollution, microplastic shedding, and the loss of valuable materials.
To tackle these challenges, the California legislature passed the Responsible Textile Recovery Act in 2024, creating the nation's first statewide framework requiring textile producers to fund and operate a comprehensive recovery system for apparel and textiles.
The law requires textile producers to join a Producer Responsibility Organization (PRO) that will develop and fund a statewide system for convenient collection, repair, reuse, and responsible recycling. The programme must:
Use ecomodulated fees to encourage better product design
Invest in the infrastructure needed to expand reuse, repair, and recycling

Support fair wages and safe working conditions
Reduce environmental and health impacts across the textile supply chain, including microfiber pollution and harmful chemicals
In February 2026, CalRecycle approved Landbell USA as California's first textiles PRO, beginning a multiyear planning process. Producers must join the PRO by July 1, 2026.
Over the next few years, CalRecycle's priorities include leading workshops, supporting producer enrolment, and guiding development of the program's first statewide needs assessment. That assessment, due in March 2027, will identify gaps in collection access, sorting capacity, repair services, recycling technologies, and end markets.
Regulations are set to take effect in 2028, followed by programme launch once CalRecycle approves the PRO's plan. Successful implementation of California's law will result in a modern textile system where consumers have convenient access to collection, producers design products that can be repaired or recycled, and new infrastructure keeps textiles in use and out of landfills.

EUROPEAN UNION

A spokesperson for the European Commission told us: The textile sector is leading the way in the transition to sustainability, but there are still challenges. The numbers on waste show the need to act. As a concrete example, with the new measures under the Ecodesign for Sustainable Products Regulation to prevent the destruction of unsold apparel, clothing, accessories and footwear, the textile sector will be empowered to move towards sustainable and circular practices, and we can boost our competitiveness and reduce our dependencies.
Note that the Commission is working on a Circular Economy Act, which will aim to establish a Single Market for secondary raw materials, increase the supply of high-quality recycled materials and stimulate demand for these materials within the EU. It will contribute to the ambition laid out in the Competitiveness Compass to make the EU the world leader in the circular economy by 2030.
[The EC also sent us the links below:]
https://environment.ec.europa.eu/strategy/textiles-strategy_en
https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52022DC0141&qid=1768920413316
https://environment.ec.europa.eu/strategy/circular-economy_en

POLAND

A spokesperson for Poland's Department of Education and Communication Ministry of Climate and Environment told us: From 1 January 2025, textile waste is subject to mandatory separate collection. This followed from the duty to implement Article 11(1) of the Waste Framework Directive.
The recent change has induced a change in consumer behaviour patterns, since consumers wishing to dispose of textiles are now required to find a municipality-operated separate municipal waste collection point. Municipalities are encouraged to complement these points with additional solutions such as mobile collection, street containers or door-to-door services, depending on local conditions. The data on the weight of selectively collected textile waste and its treatment in the first year of the operation of the scheme is not available yet.
From a financing perspective, Poland is mobilising both EU and national funds. The FEnIKS programme supports waste treatment infrastructure, including textiles. In addition, we are working on a dedicated programme under the National Fund for Environmental Protection and Water Management (NFOŚiGW) to support investment in collection systems, sorting capacity, reuse infrastructure and recycling technologies for textiles and other problematic waste streams.
The main priority for the next year is to implement the provisions of Directive 2025/1892 and effectively introduce an EPR scheme for producers of textile, textile-related and footwear products. This will ensure financing of waste management by producers but also extend the outlets available for consumers to drop off discarded textiles. Among the options considered are the requirement for all textile retailers with a significant retail space, as well as online retailers to operate collection points. Producer Responsibility Organizations will also be required to provide support for prevention of the generation of textile waste and for innovations such as fibre-to-fibre recycling.
It is expected that the timeline for adoption of the bill will be drawn up soon. Currently, the bill is yet to be added to the programme of legislative works of the Council of Ministers.

CHAPTER 8

INDUSTRY RESPONSES





TOBY MOSS

Chief commercial officer, UK, Europe, Middle East, Asia-Pacific, Worn Again Technologies

What is the single biggest barrier to scaling textile-to-textile recycling?
The short-term lever is realistic but growingly ambitious recycled content mandates that prioritise post-consumer waste sources. More broadly a long-term strategic roadmap that has wide support across all industry stakeholder groups.

Where is the most urgent infrastructure gap?
Recycling capacity.

What must happen in the next 3–5 years to make textile recycling commercially viable?
More scale up, more innovation, better materials transparency, & more investment underpinned by increasingly mature, bankable offtake agreements.



NICOLAS PROPHTE

Founder & board member, Denim Deal Foundation

What is the single biggest barrier to scaling textile-to-textile recycling?
Demand. Not technology. Not infrastructure. Demand.
The framing of this debate is wrong almost everywhere I read it. The conversation fixates on collection rates, sorting capacity, and chemical recycling breakthroughs. These are real constraints, but they are second-order problems. The primary barrier is that there is no stable, commercially predictable market pulling recycled textile fibre through the value chain.
We proved this in our UPV Eco-Modulation Pilot, a rigorous industrial test involving eight supply chain partners, processing Dutch post-consumer denim through real recycling and spinning infrastructure. The conclusion was unambiguous: textile-to-textile recycling is technically feasible today, with existing equipment, without new capital investment in recycling technology. Spinners can process POCR cotton. Weavers can work with blended yarns. Garments can be produced.
What the pilot also proved is that none of this happens at commercial scale because manufacturers cannot commit to continuous production volumes when brand demand is episodic. Brands run a pilot, publish a press release, then revert to virgin cotton procurement because it is cheaper, more consistent, and still the default choice. Until that demand signal is permanent - not pilot-driven - sorters will not invest in precision equipment, recyclers will not build throughput, and spinners will not retool lines.
The uncomfortable truth: brands hold the key. Sorters and recyclers are ready to scale the moment demand gives them the certainty to invest. The infrastructure won't come before the demand. It never does.

Where is the most urgent infrastructure gap?
Precision sorting. By a significant margin.
Collection volumes in Europe are growing - EPR legislation, municipal schemes, and brand take-back programmes are all adding material to the waste stream. The problem is what happens to that material next. The vast majority of it is sorted by hand, using visual assessment, into broad categories: wearable / non-wearable, cotton-dominant / synthetic-dominant. That is not sufficient for textile-to-textile recycling.
Fibre-to-fibre recycling - whether mechanical or chemical - requires input streams with controlled composition. For cotton recycling specifically, you need feedstock above 80 per cent cotton content, with contamination below defined thresholds for elastane, polyester, and non-fibre materials. What European sorting infrastructure currently produces is a mixed, inconsistent material stream suitable for wipers, insulation fill, and industrial rags - but not ready for spinning.
Our pilot data confirmed this directly. Feedstock quality was the single most operationally disruptive variable across the entire chain. When feedstock quality was adequate, everything downstream worked. When it was variable, unit costs increased, yield dropped, and spinner confidence evaporated.

What must happen in the next 3–5 years to make textile recycling commercially viable?
Three things, in sequence.
First, EPR eco-modulation must become real. Several EU member states are implementing textile EPR - France through Refashion, the Netherlands through UPV, Germany now establishing its own framework. But the critical lever - eco-modulation, the mechanism that charges brands lower fees if their products contain verified recycled content - is currently either absent or set at levels too low to shift procurement decisions. We modelled this specifically for Dutch policymakers: eco-modulation bonuses need to be calibrated against the actual cost premium of POCR cotton relative to virgin, not set arbitrarily. When eco-modulation is correctly priced, it closes roughly 60-70 per cent of the cost gap between virgin and recycled feedstock. That changes the commercial equation for every brand in the scheme.
Second, traceability infrastructure must be standardised before DPP goes live. The EU Digital Product Passport will require brands to disclose recycled content, material origin, and end-of-life properties at product level. This is a compliance obligation, but also an opportunity to create the data infrastructure that makes eco-modulation claims verifiable, GRS certification scalable, and consumer transparency credible.
Third, pre-competitive volume commitments must replace pilots. The pilot phase of textile-to-textile recycling is over. We know it works. What the industry needs now are multi-brand, multi-season volume commitments that give recyclers and sorters the forward visibility to invest in capacity. This is exactly the model the Denim Deal was built to enable: 60+ member brands and mills aligning on shared standards, shared targets, and shared market signals, so that no single brand bears the first-mover cost alone.



PETER MAJERANOWSKI

CEO, Circ

What is the single biggest barrier to scaling textile-to-textile recycling?
The biggest barrier is that the system was built over decades around short-term sourcing and cost optimization, which makes it harder for brands to support the long-term commitments needed to finance recycling infrastructure at scale.
We're now seeing that begin to evolve. Brands, policymakers, and investors are increasingly aligned on the need for circular solutions, but translating that into coordinated, multi-year commitments is still a new practice in a highly fragmented industry. As that alignment strengthens, it will unlock the capital required to scale.

Where is the most urgent infrastructure gap?
The most urgent gap is downstream capacity. There are not enough industrial-scale facilities that can recycle real-world textile waste, especially blends. Without scaled conversion capacity, collection and sorting have nowhere to go, so the system cannot function. That capacity is now being built and once scaled can unlock the rest of the value chain.

What must happen in the next 3–5 years to make textile recycling commercially viable?
Three things need to align: clear demand signals from brands tied to delivered output, deployment of industrial-scale facilities that can process blended textiles, and better product-level data to improve traceability and sorting. Policy can accelerate this by aligning incentives, but the model ultimately needs to stand on commercial footing. As these pieces come together, textile-to-textile recycling moves from pilot to infrastructure. In a more volatile supply chain environment, circular materials can also improve resilience by reducing exposure to virgin input price swings. When these align, the economics work.



MARCO LUCIETTI

Head of global marketing & communications, RE&UP

What is the single biggest barrier to scaling textile-to-textile recycling?
The primary obstacle is the lack of a systemic, unified approach across the entire value chain. Currently, the industry remains fragmented; the various stages, from waste collection and sorting to fibre regeneration and textile manufacturing, often operate in isolation rather than as a synchronized ecosystem. To achieve true scale, every stakeholder must align on a single path. Success requires a shared industrial language and a commitment to vertical integration.

Where is the most urgent infrastructure gap?
The most critical gap lies in the standardization of separate collection and the resulting availability of high-quality, recycling-ready feedstock. While recycling technology is advancing rapidly, it is only as effective as the material flow feeding it. Without a robust infrastructure to capture, sort, and clean post-consumer textiles at the source, the industry will continue to



struggle with inconsistent feedstock. We need an infrastructure that transforms "waste" into a reliable, industrial-grade raw material that can meet the performance standards of virgin fibres.

What must happen in the next 3–5 years to make textile recycling commercially viable?
We must move from "blueprints to baselines" by building resilient, collaborative value chains where the entire system operates in total synchronicity. Commercial viability depends on scale, and scale depends on stakeholder alignment around shared ownership, risk, and investment. In the next 3–5 years, the industry must stop treating circularity as a series of isolated pilot projects and start treating it as a core operational requirement. This means establishing a global infrastructure for textile circularity that matches the pace of both climate urgency and emerging regulatory demands, such as the EU's Ecodesign for Sustainable Products Regulation (ESPR).



ANDREAS PAPOUTSAKIS

Founder & CEO at Aparo (formerly chief information officer at Texaid)

What is the single biggest barrier to scaling textile-to-textile recycling?
The biggest barrier is not recycling technology alone. It is the absence of reliable, structured and traceable data at the source. Collection, sorting and downstream handling are still largely manual, analogue and locally specific. Before the industry can integrate or optimise anything, it first needs to create operational data where it currently does not exist.

Where is the most urgent infrastructure gap?
The most urgent infrastructure gap is coordination across a fragmented value chain. Collectors, sorters, recyclers, brands, PROs and citizens all operate in the same system, but they do not operate from the same operational picture. That is why data is fragmented: the processes, incentives and definitions are fragmented first. This is not mainly a technology problem. There are already many AI initiatives trying to solve individual problems along the chain. But the biggest lever is not optimization - it is harmonization. AI can improve a sorting process or predict material quality. But it cannot function meaningfully if a recycler in Germany works with different category definitions than a sorter in France, or a PRO in Spain reports against different standards entirely. AI needs harmonized data as a precondition, not as an output. Right now, too many initiatives are optimizing islands instead of building the network.

What must happen in the next 3-5 years to make textile recycling commercially viable?
EPR must finance more than collection. It needs to support data capture, sorting quality, citizen interaction and recycling-ready material flows. But the more fundamental requirement is harmonization across markets. Textile circularity cannot scale if every country, collector, sorter and PRO defines categories, qualities and reporting logic differently. Commercial viability will come when textile recycling is treated as infrastructure: operational data created at the source, harmonized across markets and connected to real downstream demand. This is what I call Heavy Circularity: the point where circular ambition meets physical infrastructure, operational constraints and the hard work of making data flow across the entire chain. We should not forget that textile circularity is also physical, labour-intensive and often messy operational work. Any scalable solution has to respect that reality.



ROMAIN NANCY

Founder, Rematters - textile recycling solutions

What is the single biggest barrier to scaling textile-to-textile recycling?
The primary barrier is the economic disconnect between virgin and recycled fibres, compounded by a lack of investment certainty.
Market Competitiveness: Recycled fibres currently struggle to compete with lower-priced virgin materials.
Investment Gap: Scaling requires an estimated €8–11bn in capital, yet investors face high "legal uncertainty" due to fragmented EU policies.
Supply-Demand Mismatch: Growing regulatory demand for recycled content risks outpacing the actual supply of high-quality, sorted feedstock.

Where is the most urgent infrastructure gap?
The most urgent gap is in pre-processing - the critical stage between sorting and recycling.
Current infrastructure often fails to automate the pre-sorting stage, automatically separating goods for reuse from those suitable only for recycling (separate automatically goods that are for reuse and those that are only good for recycling - both for pre-consumer (returned goods) and post-consumer goods collected by collectors/sorters). Secondly, current infrastructure fails to remove trims, buttons, and zips or separate fibres at the volumes required for industrial chemical or mechanical recycling.
To solve this, rematters is serving as the technical expert for the Feedstock Activation Europe project coordinated by Fashion For Good. We are developing the Blueprint for European pre-processing centres, identifying optimum geographic locations and the specific sorting equipment needed to deliver the right volumes and qualities of feedstock to recyclers. This project is supported by ADIDAS, Bestseller and INDITEX, this is a promising step for the future of our industry.

What must happen in the next 3–5 years to make textile recycling commercially viable?
To move from pilot projects to a resilient market, we need a combination of technical blueprints and policy de-risking:
Industrialise the Pre-processing Blueprint: The industry must deploy the sorting and preparation infrastructure we are currently architecting to ensure recyclers have steady, high-quality feedstock.
Implement Targeted Economic Incentives: The EU should introduce production-based subsidies (public support per tonne of recycled fibre) to bridge the price gap with virgin materials during this early scaling phase.
Harmonize EPR & End-of-Waste: We need unified EU standards for Extended Producer Responsibility (EPR) and End-of-Waste (EoW) criteria to allow recycled materials to move across borders without administrative friction.
Strategic Public Procurement: Governments should use Green Public Procurement (GPP) to create a "lead market," providing stable, predictable demand for recycled textiles in public sectors like healthcare and workwear.

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