

# Can fast fashion go circular?



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- **The development of better physical and chemical recycling technologies is vital for the apparel sector to develop effective circular economy models**

Developing circular economy practices that work has been a key business goal for many companies for some time. But turning around entrenched business models is difficult. And becoming a fully circular business in the apparel and textiles sector – as H&M aims to be within the next ten years – is proving tough.

H&M Group's prominent high-street fashion-recycling scheme has collected more than [29,000 tonnes](#) of used clothing, surpassing its original 2020 target to have taken back at least 25,000 tonnes.

The initiative, launched four years ago, has been a success, with the amount of clothing being collected at H&M stores, as well as several of the group's other brands such as ARKET, jumping 40% in the past year.

According to the company, up to 60% of the clothing returned is reused, and either sold again on resale platforms at a discount or given to charities. The rest is downcycled and used for other purposes such as insulation.

But just a small amount of this clothing is recycled into new textile fibres, and between 3-7% of it is destroyed via incineration.

### **Consumption conundrum**

At the heart of the challenge is solving the “consumption + under-utilisation” equation. Clothing accounts for around 60% of all textiles used, and the production of it has doubled in the last 15 years. More and more people are using their disposable income to buy more clothes, but they are not using them for long. In fact, in the same timeframe, clothing use has fallen by almost 40%.

There are plenty of barriers in the way of circularity. A saturation of the second-hand clothes market means that too much is being collected, only to be incinerated or landfilled because it can't be sold on or repurposed. And the fast-fashion churn means that a lot of fibre is of poor quality, making recycling all the more challenging.

Then, there's a lack of consumer engagement. “Right now, there's no real market demand for genuine, closed-loop recycling of apparel, especially from consumers. So, there's not enough incentive for brands to supply it at scale,” says circular economy expert Maxine Perella.

For raw materials suppliers, this supply-demand conundrum is stifling progress.

The limited availability of materials that are sustainable – whether bio-based, recyclable or biodegradable – and offer at least the same, or better, performance than petro-based products, is frustrating. Moreover, the wide availability of those cheap, petro-based products remains a barrier, as is the “unrealistic expectation from brands that products with circularity built into them can be as cheaply produced as those without circular design products and principles,” says Renee Henze, global marketing and channel development director at DuPont Biomaterials.

### **Building to last**

Better design, including building principles of circularity into the process from the beginning, is crucial. While the creation of quality clothing, made to last, remains a niche market, the seasonal nature of fashion – cheap or otherwise – gives brands plenty of opportunity to be more sustainable.

At DuPont, new materials being developed in the R&D lab are designed with a lifecycle assessment approach, considering what renewable materials will be used, and whether the resulting product will perform better than what went before. “We're constantly asking these questions, such as how could the product be used for more

than its intended purpose and how do we build in options for end-of-life, including recyclability and biodegradability,” Henze adds.

A good example of how brands are embracing this type of thinking is in the manufacture of jeans. Another 17 firms have just signed up to the Ellen MacArthur Foundation-backed [Jeans Redesign project](#) taking the total to 47. The project sees companies – from brands, to mills and manufacturers – working together to develop guidelines and minimum requirements for durability, recyclability and material health.

Elsewhere, the Welsh denim brand Hiut has come up with its first micro-plastic free, [biodegradable stretch jeans](#). It has partnered with Candiani to make use of its plant-based Coreva stretch technology, created using organic cotton wrapped around a natural rubber core, to replace synthetic and petrol-based elastomers.

The American brand Lee has also developed its [Back to Nature](#) jeans that can be composted after use. They are made using compostable linen-cotton yarns (85% cotton, 15% flax linen), and no metal rivets.

### **Recycling limitations**

Of course, such innovative products are small-scale. The majority of clothing still needs to be recycled – and the apparel industry’s desire and business models are ahead of current recycling infrastructure, Henze says. She argues that the sector globally does “a really poor job at recycling due to the limitations in physical recycling technology.”

Many ubiquitous materials, such as Spandex, cannot currently be recycled. And often, items contain blends that cannot easily be separated into their individual components. “Plus, the materials that are a result of physical recycling don’t always have the same desired properties as their virgin counterparts,” she says.

According to [Circle Economy](#), currently a quarter of textiles collected have the potential to be recycled into new textiles but are not. That’s 486,000 tonnes of clothing a year.

This fact makes the development of automated sorting technologies all the more exciting. [Fibersort](#) is a near-infrared-based technology that has been in development for several years, but is now said to be market-ready. The machine is able to categorise textiles into 45 different fractions based on their colour and fibre composition and can sort around 900kg of post-consumer textiles an hour.

H&M Foundation, meanwhile, has invested in a [hydrothermal recycling process](#) for dealing with textile blends – something it has promised to make freely available to the industry. While not yet operating at scale, this process can take blended garments and separate cotton and polyester fibres allowing these to be used to

manufacture new clothes.

### **A touch of chemistry**

Capturing even more value from the resources in clothing that has reached the end of use demands chemistry. Chemical recycling is the only way to get raw materials back and close the loop on textiles – and it is an exciting step in circular design.

The main problem when it comes to garment-to-garment recycling is fibre quality. Well-worn T-shirts cannot be torn apart and made into new garments because fibres are no longer of sufficient quality.

While some companies have mixed recycled fibres with virgin fibres, more and more are looking at breaking down fibres into their chemical building blocks, and then rebuilding them into new fibres that have the same, or better, performance characteristics than virgin fibres.

In the UK, [Worn Again](#) claims its technology can reprocess pure and blended cotton and polyester textiles – which together account for 80% of all clothing and textiles – with “no price premium to manufacturers, brands or the consumer”.

However, by and large, the companies pioneering technology in this arena are still in the research and development and pilot stage. The scaling up of fibre recycling in apparel is being held back by a lack of access to materials prepared and ready for recycling, as well as the capital required for large plants.

Business group RGE is hoping to change that by [supporting proven technologies](#) that could be suitably scaled up.

Through Sateri in China and Asia Pacific Rayon (APR) in Indonesia, it is the world’s biggest producer of viscose. Last year, it committed to invest \$200m over the next ten years in innovations that advance circularity in the production of materials for the apparel industry.

It has already started, with investments in Finnish start-up [IFC](#), that uses cellulose carbamate technology to make cotton-like fibre from waste cardboard and pulp – perfect, given APR’s sister company APRIL is one of Indonesia’s biggest paper and pulp companies. The fibre has been tested by a number of brands, including H&M and VF Corporation – and IFC’s ultimate goal is to licence the technology for others to use.

RGE is also working with [Re:newcell](#) to industrialise the production of viscose using recycled cotton by 2025. It uses a polymer-recycling process to dissolve fabrics to create “circulose pulp”. This can then be extruded into new fibres and spun to create yarn.

“Our goal is to make sustainable fibre products at a cost that is affordable to all consumers,” says Cherie Tan, APR’s vice-president for communications and sustainability. “We’re in this industry for the long haul, and we want to co-create solutions for real commercial viability, as well as transformation of the sector.”

### **Collaboration ahead**

As these innovations attest, achieving circular, closed-loop apparel is possible. H&M currently produces more than half of its products from recycled or “sustainably sourced” materials, as it marches towards its goal of being truly circular by 2030.

But it’s a big task. Covid-19 might have stalled growth in 2020, but the fashion industry typically grows by 4-5% a year and is predicted to reach \$3.3 trillion by 2030, from \$1.9 trillion in 2019.

For circularity to fix apparel’s problems will demand unprecedented collaborative working, widespread product redesign, and an industrial level scaling up of technology that is still at the design stage in most cases.

And everybody within the value chain has a shared responsibility, adds Tan. “What’s encouraging is that there is a lot of collaboration happening – not just having dialogue but co-creating solutions together.”

<https://www.innovationforum.co.uk/articles/can-fast-fashion-go-circular>

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