

ROI of Robotic Sewing:

Where do automation investments truly pay off?



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A Textile Today Innovation Hub publication.

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**Photo:** EU Parliament ©DW

# CSRD & CSDDD officially delayed by European Parliament

■ Daniel Brown

European Parliament has officially delayed the implementation of two landmark sustainability regulations, the Corporate Sustainability Reporting Directive (CSRD) and the Corporate Sustainability Due Diligence Directive (CSDDD), following a decisive vote on April 3, 2025. With 531 votes in favor, 69 against, and 17 abstentions, Members of the European Parliament (MEPs) overwhelmingly supported the European Commission's "stop-the-clock" proposal, granting companies additional time to comply with the

stringent requirements.

The decision, part of the broader Omnibus Simplification Package aimed at reducing administrative burdens and enhancing EU competitiveness, pushes back the CSRD reporting timeline for certain companies by two years and delays the CSDDD's first phase by one year. Large companies with more than 250 employees, originally set to begin CSRD reporting in 2026 or 2027, will now start in 2028 for the fiscal year 2027. Listed small and medium-sized

enterprises (SMEs) have until 2029 to comply. Meanwhile, the largest companies under the CSDDD—those with over 5,000 employees and €1.5 billion in turnover—will also see their compliance timeline deferred to 2028, with member states granted until July 2027 to transpose the directives into national law.

The European Commission first proposed the delay in February 2025, citing the need to simplify the bloc’s corporate sustainability frameworks amid concerns from businesses about the regulatory burden. The CSRD requires companies to report on their environmental and social impacts, while the CSDDD mandates due diligence to identify and address human rights and environmental risks in supply chains. Critics of the original timelines argued that the requirements were overly complex, particularly for smaller companies, and could hinder economic competitiveness in a challenging global climate. The delay was formalized after the European Council endorsed the draft text on March 26, with the Parliament’s approval on April 3 marking the final legislative step. The European Financial Reporting Advisory Group (EFRAG) has been tasked with revising the European Sustainability Reporting Standards (ESRS) under the CSRD, with a seven-month deadline to reduce the number of required data points and streamline reporting processes.

While the move has been welcomed by industry groups, including the insurance sector, which endorsed

the postponement as a way to ease compliance pressures, it has sparked debate among environmental advocates and some lawmakers. MEP Tilly Metz criticized the lack of an impact assessment or public consultation prior to the decision, warning that “rolling back sustainability laws under the guise of cutting red tape will not solve the structural problems of the European economy.” Others, however, see the delay as a pragmatic step, giving businesses clarity and breathing room to adapt to the new rules.

The Omnibus Package also includes proposed changes to the scope and content of both directives. For the CSRD, the threshold for compliance may be raised to companies with over 1,000 employees and €50 million in revenue, potentially excluding up to 80% of previously covered companies. For the CSDDD, companies will now only be required to conduct full due diligence beyond direct partners if they have credible evidence of adverse impacts deeper in the supply chain—a significant reduction from the original requirement for systematic in-depth assessments.

Across the Atlantic, the delay has drawn attention from U.S. policymakers. House Financial Services Chair French Hill (R-Ark.) described the CSDDD as a “non-tariff barrier” for U.S. companies, while Senator Bill Hagerty (R-Tenn.) recently introduced a bill to bar U.S. firms deemed “integral to national interests” from complying with



foreign sustainability due diligence laws, signaling potential transatlantic tensions over the EU’s green agenda.

As the EU shifts focus to broader reforms of its sustainability frameworks, the Legal Affairs Committee of the European Parliament will now begin work on the substantive changes proposed in the Omnibus Package.

While the delay offers companies a reprieve, experts urge businesses to continue preparing, as sustainability reporting and due diligence will eventually become mandatory. For now, the decision marks a significant recalibration of the EU’s ambitious Green Deal, balancing environmental goals with economic realities in an increasingly complex global landscape.

# India’s ‘Sporttech Pavilion’ to highlight sustainable sportswear tech

■ Matthew Davis



**Photo:** Raj Manek (Right), Executive Director & Board Member, Messe Frankfurt Asia Holdings Ltd and Kishan Daga (Centre), Anchor Founder, Concepts N Strategies

Techtextil India 2025 will introduce the “Sporttech Pavilion,” a curated showcase of India’s emerging sustainable sports and performance fabric suppliers.

The initiative, backed by Messe Frankfurt, aims to position India as a destination for innovation in functional fabrics, moisture control, and wearable

integration. Products on display will include antimicrobial knits, low-impact dyeing systems, and biosensor-enabled athletic gear.

India’s competitive cost structure and manufacturing base could make it a serious contender in the high-growth global sportswear segment.

# British fashion manufacturing eyes resurgence amid global realignments

■ Matthew Davis

As global fashion supply chains continue to adapt to geopolitical tensions and environmental imperatives, British fashion manufacturing is experiencing an unexpected resurgence. A combination of rising import tariffs, supply chain fragility, and increased sustainability legislation is making domestic production attractive once again.

A recent report by the UK Fashion and Textile Association (UKFT) reveals that inquiries for local sourcing have risen by 35% since late 2024. Luxury houses such as Burberry and emerging brands like Phoebe English are expanding British workshops, with a focus on low-waste pattern cutting, regenerative textiles, and artisan-level finishing.



**Photo:** UK's David Nieper Ltd employs more than 300 staff

Government initiatives are playing a role too. “Made Smarter” and the “UK Manufacturing Renaissance” grants are helping SMEs digitize their operations and improve energy efficiency. At the same time, public sentiment toward ethical consumption is rising—especially among younger consumers and export clients demanding full traceability.

UK-based production also allows for tighter feedback loops between designers and makers, faster turnaround times,

and a reduction in emissions linked to global transport. With upcoming EU-style regulations expected to mandate environmental disclosures, local sourcing may soon offer not just a cultural edge, but a compliance advantage.

If momentum holds, Britain could see the emergence of regional micro-factories and cooperative production models—redefining what “Made in the UK” means for the 21st-century fashion economy.





**Photo:** EU Parliament ©DW

# EIM releases first global report on denim industry's environmental impact

■ **Luke Wilson**

In a groundbreaking move toward greater transparency and sustainability, Environmental Impact Measuring (EIM), the global platform created by technology innovator Jeanologia, has released its first comprehensive report titled “The Innovations and Challenges in Denim Finishing: 2024 Report.”

This milestone document provides a detailed overview of the environmental footprint of the denim finishing sector based on data collected from over 115,000 operations worldwide.

The report reveals encouraging progress, highlighting that 63% of assessed denim finishing processes have already been classified as having minimal environmental impact. This indicates a positive trend toward responsible production practices within the global denim industry.

However, the report also underscores critical areas of concern. Notably, 24% of the processes still involve hazardous chemicals, such as potassium

permanganate and pumice stones. These substances are known to be harmful not only to the environment but also to workers’ health. The report stresses the urgent need to transition toward safer, more sustainable alternatives. Water consumption, a long-standing issue in denim production, remains a key challenge. On average, 30 litres of water are used per garment in denim finishing, exceeding the recommended 22.5 litres. To combat this, the report suggests implementing advanced technologies such as ozone, e-flow, and smart foam systems, which have proven to significantly reduce water usage. Additionally, adopting textiles that require less intensive treatments and optimising rinse procedures can further improve water efficiency.

Another major recommendation is the adoption of ZDHC-certified

chemicals and increased automation and digitalisation of production processes. These innovations not only help reduce chemical consumption but also enhance worker safety and overall process efficiency.

Since its inception in 2009, and global implementation beginning in 2011, the EIM platform has grown into a trusted benchmark for sustainability within the denim industry. Major global retailers and brands including H&M, Levi’s, M&S, AEO, Primark, Mango, Guess, Tommy Hilfiger, and C&A now rely on EIM to measure and manage their environmental performance.

As the industry continues to face mounting pressure to adopt sustainable practices, EIM’s data-driven insights provide a much-needed roadmap for meaningful change—paving the way for a more responsible denim future.





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# Run & Relax introduces SS25 activewear using Q-NOVA® by Fulgar

■ Luke Wilson



Scandinavian activewear brand Run & Relax has unveiled its Spring/Summer 2025 collection featuring Q-NOVA® by Fulgar—a nylon yarn made from 99% recycled raw materials. The launch represents the brand’s deepening commitment to sustainability without compromising on performance.

Run & Relax’s new line emphasizes minimalist Scandinavian design, enhanced by moisture-wicking, lightweight, and stretchable properties intrinsic to Q-NOVA®. The material is certified by the Global Recycled Standard (GRS) and produced via a mechanical process with low environmental impact.

Founded in Norway, the brand is known for merging mindfulness and movement, catering to yoga, Pilates,

and light training audiences. The SS25 line includes leggings, crop tops, and breathable jackets, with pastel tones inspired by Nordic nature.

This move aligns with growing demand for eco-conscious activewear in Europe and Asia, particularly among millennial and Gen Z consumers. Fulgar, the Italian yarn producer behind Q-NOVA®, has also reported increased uptake across fashion and sportswear brands, highlighting the material’s scalability.

Retail analysts predict that collaborations like these will become the norm as consumers demand transparency, and brands compete to marry form, function, and footprint. The collection is already available on the Run & Relax website and select retail partners across Europe.



# Cambodia gains market share in swiss apparel sector

■ Benjamin Harris



Cambodia has made notable strides in expanding its footprint in global apparel markets, particularly in Switzerland. According to recent trade data, Cambodia's apparel exports accounted for 3.14% of Switzerland's total apparel imports in early 2025, marking a significant increase from previous years.

This growth reflects Cambodia's improved manufacturing infrastructure and competitiveness in cost-effective garment production. The country's factories, primarily clustered around Phnom Penh and Sihanoukville, are increasingly equipped with modern machinery and quality control systems. These upgrades have enabled Cambodian exporters to meet the high

standards required by European buyers.

Trade analysts suggest that Cambodia's preferential trade arrangements under the EU's Everything But Arms (EBA) initiative have played a critical role. While Switzerland is not part of the EU, it has a number of bilateral agreements that align with EBA principles, making Cambodian garments attractive due to lower duties.

Western brands are diversifying their sourcing away from China due to rising costs and geopolitical tensions. This has opened doors for Cambodian manufacturers, who offer a blend of price competitiveness and improving compliance with labor and environmental standards.

# GALLS® acquires HerBlueWear Uniforms™

■ William Moore



GALLS®, a leading supplier of public safety and tactical gear, has officially acquired HerBlueWear Uniforms™, a brand known for its tailored apparel solutions for women in law enforcement. The acquisition marks a significant step toward inclusivity and functional design in the uniform market. HerBlueWear, founded by a former law enforcement officer, was created to fill a longstanding gap in the market: professional, durable, and well-fitting uniforms for female officers. The brand has gained loyalty for prioritizing comfort, performance, and aesthetics tailored to women’s body types—an often overlooked area in standard-issue

uniforms. With this acquisition, GALLS® plans to integrate HerBlueWear’s design principles into its broader product line, expanding its reach across police departments, fire services, and federal agencies. The move also reflects growing industry attention to diversity, equity, and inclusion—not just in staffing but also in product design and procurement practices. Executives at GALLS® noted that this acquisition aligns with their mission to “serve those who serve,” and addresses evolving needs in uniform technology, gender responsiveness, and workplace comfort. Product rollouts combining both brands are expected by Q3 2025.



# Functional Fabric Fair 2025 (USA) showcases sustainable innovation

■

Jack Thompson



Portland’s 2025 Functional Fabric Fair brought together over 300 exhibitors and thousands of visitors from April 14–16, reinforcing the industry’s growing commitment to sustainable performance materials.

Highlights included innovation zones focused on biodegradable synthetics, bio-based finishes, and traceable functional fabrics. A dedicated Day 0 Sustainability Workshop offered tools to assess environmental impact during fabric selection and sourcing.

New entrants showcased AI-integrated textiles, antimicrobial knits made from seaweed fibers, and waterproof membranes with zero PFAS content. Attendees also explored tools for lifecycle assessments and blockchain-backed certification audits. The event proved that performance doesn’t need to come at the planet’s expense—and that suppliers are racing to meet stringent global demands for greener, cleaner, traceable materials.

# Montana technologies unveils ultra-efficient cooling system

■ Harry White

Montana Technologies has introduced a breakthrough in air conditioning technology with its AtmosZero™ dehumidification system—an innovation that could slash cooling energy consumption in textile factories by up to 90%.

Unlike conventional HVAC systems that cool and dehumidify air simultaneously, AtmosZero separates these processes. It uses a patented desiccant-based system to remove humidity before the air reaches the cooling coil. This significantly reduces the workload of the compressor, which is the most energy-intensive component.

In textile manufacturing, especially in tropical regions like South Asia, maintaining low humidity is essential for yarn strength, dye precision, and machine efficiency. Traditional cooling methods, however, are highly power-intensive and often unreliable during grid fluctuations.

Early pilot installations of AtmosZero in Vietnamese spinning and dyeing units have shown dramatic results. Monthly

electricity bills dropped by nearly half, and the ambient environment became more consistent—reducing fabric defects and machine wear.

Beyond textiles, the system is gaining attention from semiconductor and pharmaceutical industries, where moisture control is equally critical. The cooling units are modular, easy to retrofit, and can run on low-carbon refrigerants—making them a fit for LEED and EDGE-certified green buildings.

Montana Technologies is scaling its production and exploring strategic partnerships with apparel brands that have committed to carbon neutrality. Analysts view this as a key development in meeting Science Based Targets (SBTi) for energy-intensive industries.

As climate change accelerates, cooling demand is projected to triple by 2050. Technologies like AtmosZero offer a path to meet this demand responsibly, especially for sectors like textiles where heat and humidity are unavoidable variables in quality and productivity.



# Smart Grids bring precision power to manufacturing

■ Daniel Brown

As renewable energy integration becomes a core objective for industrial sustainability, smart grid technology is stepping up as a precision tool for modern manufacturing—including the textile and apparel sector. Smart grids use digital communication, AI, and IoT sensors to monitor, distribute, and optimize electricity usage in real time.

Unlike traditional power grids, which operate on fixed schedules and centralized control, smart grids allow dynamic load balancing. In industrial parks or manufacturing zones, this means diverting power to energy-intensive operations when demand is low and pulling from renewable or stored energy during peak hours.

In Europe and parts of Asia, smart grid pilots have demonstrated energy savings of 10–15% in textile dyeing and finishing facilities. Factories can forecast load demands, prioritize low-emission energy sources, and receive automated alerts for maintenance and anomalies. These grids also support “demand response” incentives, where users are rewarded for reducing usage during critical hours. The digitization of power infrastructure also ties into carbon reporting and compliance



frameworks. Many smart grid systems include dashboards and APIs that track scope 2 emissions in real time—useful for meeting international buyer requirements for transparent energy usage.

One leading example is the “Smart Textile Cluster” initiative in Portugal, where mills are connected through a shared grid powered by hydro and solar energy. The system allocates power based on real-time efficiency scores, creating a benchmark model for scalable, data-driven sustainability.

Smart grids are expected to become an industry norm by 2030, especially in light of increasing climate-related disruptions and volatile energy pricing. For textile manufacturers, early adoption provides a competitive edge—not just in cost savings, but in proving environmental accountability to global brands.

# Trützschler, O.R.V. & Texnology achieve breakthrough in precision filtration

■ Matthew Davis

In a remarkable demonstration of collaborative engineering and technical innovation, O.R.V. MANUFACTURING S.P.A., Texnology s.r.l., and Trützschler Nonwovens have successfully completed a milestone R&D trial at Trützschler's Technical Center in Egelsbach, Germany.

This high-stakes two-day trial marked a significant step toward the development of next-generation filtration products designed to meet complex industrial requirements.

## Meeting Complexity with Precision

The trial tackled an ambitious scope, involving:

- » 11 different fibers ranging from 1 to 40 Dtex
- » 7 distinct fiber blends



**Photo:** The Team Behind the Development of Precision Filtration Technology

» 11 product variations from 25 gsm to 850 gsm

To meet these challenges, the team leveraged Trützschler's T-Suprema needle punching line, a solution that demonstrated exceptional versatility and precision throughout the process. The success of the trial underlined the T-Suprema's ability to adapt to complex product parameters and customize performance to specific client demands.

## Engineering at Its Best

Trützschler Nonwovens' engineering team worked in close coordination with O.R.V.'s production and R&D units, ensuring real-time problem-solving and solution implementation. According to the team, the trial not only validated the capabilities of the T-Suprema line but also laid the groundwork for one of Europe's largest filtration production lines – a significant leap forward for the nonwovens sector.



**Photo:** Elastic band pulling apart test to measure the elongation

# Innovative automated stretch elastic waistband sewing machine

■ Luke Wilson

A new research paper published on arXiv has unveiled an innovative automated sewing machine designed specifically for attaching stretch elastic waistbands, commonly used in activewear and intimate apparel. The breakthrough technology integrates sensors, motor controls, and synchronized feeders to handle variable elasticity and fabric tension, a task traditionally dependent on skilled labor. The system features a sensor-based waistband expansion unit that automatically adjusts to

fabric specifications, eliminating inconsistencies in seam strength and stitch uniformity. With its intelligent feedback loop, the machine adjusts needle speed and feeder tension in real time, ensuring precision at high production speeds. Researchers claim that the prototype can reduce labor input by 70%, while increasing output consistency and reducing defect rates. The adoption of such machines could transform mid-sized factories that struggle to maintain product quality during scale-up.



The research emphasizes that integrating such machines into lean production systems can also improve ergonomics and reduce repetitive strain injuries among operators. Pilot testing in select Bangladeshi and Vietnamese factories has shown promising results, sparking interest

from OEMs and automation providers. The innovation represents a significant step forward in precision automation for apparel manufacturing, particularly as brands seek higher quality standards, labor cost control, and just-in-time production capabilities.

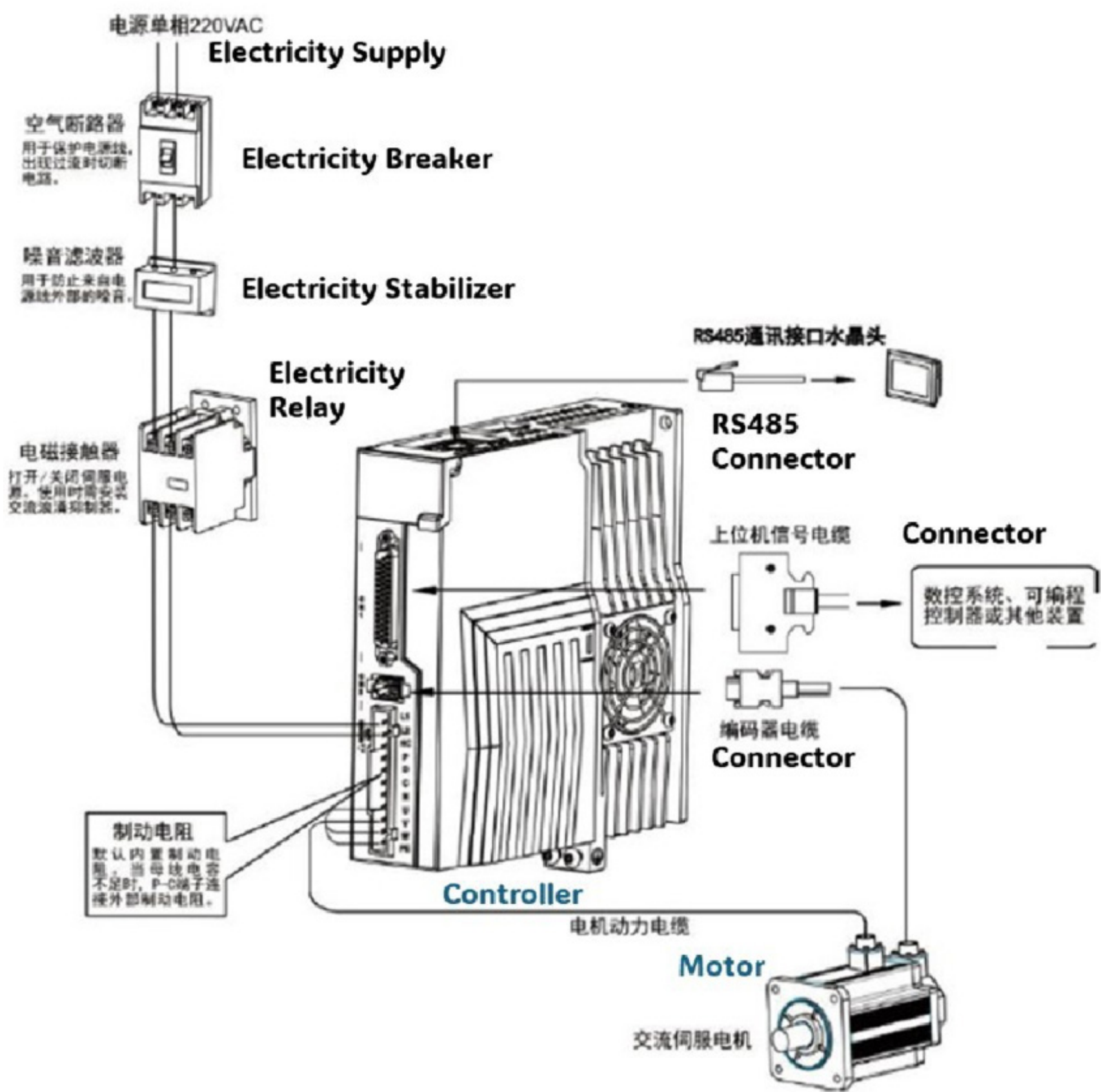


Photo: Elasticity control schematic diagram



# Jay Apparel Group expands operations in central america to navigate tariff crisis

■ Oliver Taylor

Jay Apparel Group, a U.S.-based apparel company headquartered in New York, has announced a significant expansion into Central America. This strategic move is aimed at countering the impact of rising tariffs and supply chain disruptions by relocating and diversifying its manufacturing operations closer to the North American market.

In response to shifting trade dynamics and the global tariff crisis, Jay Apparel Group will establish new production facilities in Honduras and other key Central American locations. The decision comes amid growing pressure on apparel manufacturers to reduce lead times, manage costs, and maintain agility in sourcing.

“Central America offers an exceptional opportunity for nearshoring due to its proximity, favorable trade agreements, and growing textile infrastructure,” said Jay R. Kapadia, President of Jay Apparel Group. “This expansion will allow us to enhance flexibility, mitigate tariff exposure, and continue delivering value to our retail partners.” The company’s operations in Central America will focus primarily on producing men’s woven sport shirts and other core product categories. The new facilities will take advantage of benefits provided under the Dominican Republic–



Central America Free Trade Agreement (CAFTA-DR), enabling duty-free access to the U.S. market and encouraging investment in the region.

The expansion is projected to create hundreds of new jobs, support local economies, and reinforce Jay Apparel Group’s commitment to responsible sourcing and innovation. By reducing dependency on Asian manufacturing hubs, the company seeks to build a more resilient and responsive supply chain.

Industry analysts view this move as part of a broader trend among apparel brands reconsidering global sourcing strategies in light of economic volatility, transportation bottlenecks, and geopolitical uncertainties. Nearshoring to Central America is increasingly seen as a viable long-term strategy for North American apparel companies aiming to improve speed-to-market and reduce exposure to external shocks.



**Photo:** ROI of Robotic Sewing: Where do automation investments truly pay off?

# ROI of Robotic Sewing: Where do automation investments truly pay off?

■ M A Mohiemen Tanim

As the global apparel industry grapples with rising labor costs, shrinking lead times, and increasing pressure for compliance and quality consistency, robotic sewing has emerged as a futuristic yet pragmatic solution. From sew-bots to semi-automated modules, the conversation has shifted from “Will this work?” to “Where does it work best?”

## The Promise of Robotic Sewing

At the heart of robotic sewing lies the vision of automated precision: machines

that can stitch garments with minimal human intervention while maintaining consistency, speed, and quality. In theory, automation reduces:

- » Labor dependency in a tight-skilled labor market
- » Human error, especially in quality-sensitive segments
- » Lead times, aligning with fast fashion and just-in-time production

However, in practice, the implementation of robotic sewing is neither universal

nor equally beneficial across all product types or production contexts. ROI varies significantly based on garment complexity, production volume, and integration capabilities.

## Breaking Down the Investment

### Initial Capital Expenditure (CapEx):

- » A fully automated robotic sewing unit (e.g., from SoftWear Automation or Sewbotics) can cost between \$100,000 to \$350,000.
- » Semi-automated modular workstations, like programmable sewing arms or edge-alignment robots, range from \$15,000 to \$60,000 per station.

### Integration and Training:

- » Additional costs include integration with ERP/MES systems, technician training, factory floor modification, and downtime during the learning curve.

### Operational Costs:

- » Electricity consumption, preventive maintenance, and consumables like sensors or robotic fingers need to be factored into Total Cost of Ownership (TCO).

### Where ROI Makes Sense

T-Shirts and Basic Knits (High Volume, Low Complexity)

The sweet spot for robotic sewing lies in high-volume, low-skill garments — think T-shirts, briefs, or socks.

### Why It Works:

- Minimal panel variation and seam complexity
- Easily programmable repetitive tasks (e.g., sleeve attach, hem folding)
- Large production batches amortize CapEx faster

### ROI Snapshot:

A robotic T-shirt sewing line operating 24/7 can reduce labor costs by up to 60%, and recover the investment within 18–24 months in high-wage countries like the U.S. or Germany.

### Case Example:

SoftWear Automation’s T-shirt sewbot platform, tested in Atlanta, reported production speeds of 1 shirt every 22 seconds, with quality metrics matching or exceeding human benchmarks.

### Factories in High-Wage or Compliance-Intensive Zones

In countries with high labor costs or tight compliance regulations, automation improves not only cost efficiency but also audit readiness.

### Strategic Gains:

- » Reduced worker fatigue and injury risks (especially in repetitive strain tasks)
- » Enhanced traceability and quality tracking
- » More stable operations in volatile labor markets



## Seam-Specific Automation (Instead of Full Garment)

Full-garment automation may be elusive for now, but partial robotic integration (seam or function-specific) offers measurable ROI.

### High-ROI Applications:

- » Automated bartack machines for belt loops or pockets
- » Elastic waist attach modules with tension sensors
- » Collar setting or cuff pressing modules with robotic feeders

### Financial Insight:

Adding a \$20,000 robotic waistband attachment unit can reduce manpower by 2 operators and improve cycle time by 25%, resulting in ROI in 12–18 months for mid-scale factories.

## Where ROI Falls Short

### High-Complexity Garments (e.g., Jackets, Dresses, Denim Tops)

Precision handling of varied fabrics, variable seam directions, or intricate styling elements remains a challenge for full automation. Garments that require:

- » Drape control
  - » Manual folding or pleating
  - » Multi-layer sewing with shifting fabric densities
- still rely heavily on human dexterity.

## Insight:

A blazer may involve 80+ operations, many requiring nuanced handling. Attempting to automate these fully often leads to low utilization of expensive robotic units, diminishing ROI.

## Low-Wage Manufacturing Hubs

In regions like Bangladesh, Ethiopia, or Myanmar where labor costs remain low, the labor substitution advantage is minimal. ROI may take 5–7 years, often outpaced by labor turnover and operational reconfiguration needs.

However, these regions could benefit from automation in finishing and quality inspection, which adds value without displacing jobs drastically.

## Strategic Metrics to Evaluate ROI

To go beyond pure financial metrics, ROI in robotic sewing should also be evaluated using:

| Metric                                | Description  |
|---------------------------------------|--|
| Cost per Garment (CPG)                | Total operating cost divided by units produced                 |
| OEE (Overall Equipment Effectiveness) | Measures machine availability, performance, and quality output |
| Uptime %                              | Indicates machine reliability and maintenance efficiency       |
| Defect Rate Reduction                 | Tracks improvement in quality consistency                      |
| Time-to-Market                        | Measures acceleration in delivery lead times                   |



### The Hybrid Model: Human + Machine Collaboration

The future of sewing isn't about replacing workers, but augmenting them. A hybrid workstation where operators handle fabric alignment and machines execute precision stitching can deliver:

- » Faster learning curves
- » Flexible batch runs
- » Lower CapEx with faster ROI

Companies like Juki, Durkopp Adler, and Pegasus are leading this hybrid shift with IoT-embedded smart machines, touchless foot control, and AI-assisted stitch programs.

### Policy and Brand Push: ROI Beyond the Factory

Several brands and buyers are incentivizing automation by offering:

- » Volume commitments to justify CapEx
- » Shared investment models

» Sustainability-linked sourcing premiums (automation reduces waste, rework, and energy)

Governments in Vietnam, China, and Indonesia are also offering automation subsidies or tax breaks to accelerate smart factory adoption.

### Conclusion: Robotic ROI Is About Fit, Not Fantasy

Robotic sewing delivers strong ROI when the product type, volume, and labor context align. It's not about full automation of fashion production today, but about precision targeting of repetitive, high-waste, or high-risk tasks.

In the long term, factories that build modular, scalable automation ecosystems — combining robotics, AI, and operator expertise — will lead the SPACE (Sustainability, Precision, Automation, Circularity, Energy) transformation of textile and apparel manufacturing.





**Photo:** ©Photo: Brad Geyer / Vogue Business

## Refiberd wins CFDA x eBay circular fashion fund

■ Benjamin Harris

In a notable development for circular fashion and textile innovation, Refiberd, a U.S.-based startup, has been awarded the top prize in the CFDA x eBay Circular Fashion Fund competition, securing a \$300,000 grant from eBay Ventures. The award recognizes startups that are pushing the boundaries of circularity and sustainability in the fashion industry.

Refiberd has garnered industry attention for its cutting-edge use of hyperspectral imaging and artificial intelligence to sort and identify textile fibers. This technology addresses one of the most persistent challenges in textile recycling:

the mislabeling of fabrics and the complexity of fiber blends. By accurately identifying materials, Refiberd's system facilitates effective textile-to-textile recycling, which is essential for scaling circular economy models in the apparel sector. Co-founders Sarika Bajaj, Annette Chang, and Maia Zhang emphasized that this grant will accelerate their R&D efforts and enable broader partnerships with recyclers and fashion brands. Their long-term goal is to eliminate the need for virgin fiber production by making high-quality recycling scalable and efficient. The CFDA x eBay Circular Fashion Fund is





**Photo:** ©Photo: Brad Geyer | Vogue Business

part of a broader industry push toward sustainability. Launched in 2023, the initiative seeks to foster innovation that reduces waste and increases circularity across the fashion value chain. This year’s finalists included emerging players working on resale technology, rental infrastructure, and biodegradable textiles, but Refiberd stood out due to its highly technical approach and real-world impact.

eBay’s involvement in the circular fashion space aligns with its strategic goal of

extending product life cycles. The marketplace platform has long been a hub for resale, and this partnership with CFDA marks its deepening commitment to environmental stewardship in fashion.

This win not only highlights the potential of technology to drive sustainable innovation but also positions Refiberd as a critical player in the future of fashion recycling infrastructure. With support from eBay and the CFDA, the startup is well poised to contribute significantly to reducing fashion’s global waste footprint.



# Simplifyber secures series A funding for fully biodegradable garments

■ William Moore

Simplifyber, a New York-based material innovation startup, has raised Series A funding to advance its groundbreaking approach to sustainable garment production. The company develops fully biodegradable, molded garments using liquid cellulose derived from wood pulp—bypassing traditional cut-and-sew processes entirely.

The funding round, led by At One Ventures with participation from H&M Group Ventures and Techstars, underscores growing investor confidence in next-gen textile solutions. Simplifyber plans to use the capital to scale its proprietary fiber-molding technology, expand its production capacity, and enter new market segments.

Unlike conventional garments, Simplifyber's products are formed in three-dimensional molds, reducing



**Photo:** THE FOOTWEAR OF THE FUTURE: Simplifyber's soft, fabric-like shoe uppers are created from a cellulose-based liquid, and are fully biodegradable and recyclable.

material waste by up to 60% and eliminating microplastic shedding. The materials are compostable at end-of-life and consume significantly less water than cotton or synthetic blends.

The startup is currently piloting apparel lines with select fashion and athletic brands and expects to roll out co-branded products by early 2026. Industry observers have noted Simplifyber's potential to disrupt not only fashion but also packaging and home textiles.

CEO Maria McManus stated, "Our mission is to transform manufacturing from a waste-heavy, toxic process to a regenerative, nature-based system." With consumer demand for biodegradable and ethically sourced apparel growing, Simplifyber's innovation could mark a turning point in how fashion is made.



# Craftevo Japan: Leading the Charge in Sustainable Textiles

■ Sas Enterprise



In the dynamic world of sustainable fashion, Craftevo Japan, a brand under V&A Japan Corporation, is making waves with its innovative and eco-friendly textile solutions. Renowned for their dedication to environmental sustainability, Craftevo's products are designed to minimize waste and carbon emissions, setting a new benchmark in the textile industry.

## Innovative Products

Craftevo's flagship product line, **\*\*ReTE\*\***, features a revolutionary type of polyester that decomposes into water and carbon dioxide under specific composting conditions<sup>2</sup>. This groundbreaking material is not only durable during regular use but also environmentally friendly at the end of its lifecycle. By returning used products

for composting, consumers can actively participate in reducing landfill waste and lowering carbon emissions<sup>2</sup>.

## Product Details

**1. ReTE Polyester:** Engineered to break down through hydrolysis when exposed to moisture, heat, and microorganisms in compost<sup>2</sup>. This process significantly reduces the environmental footprint compared to traditional polyester, cutting CO2 emissions by 40% during disposal<sup>2</sup>. The ReTE polyester maintains its durability during regular use, ensuring that it meets the functional needs of consumers while being eco-friendly at the end of its life.

**2. Collection and Composting:** Craftevo encourages customers to return used products, which are then processed in composting facilities<sup>2</sup>. This initiative



promotes a circular economy, where products are sustainably returned to the earth. The company has set up collection boxes in stores and provides return options for customers, making it easy for them to participate in this eco-friendly initiative<sup>2</sup>.

**3. Product Identification Tags:** Each product made with ReTE polyester comes with a unique identification tag, allowing for easy tracking and return for composting<sup>2</sup>. This system ensures that every product can be properly processed at the end of its lifecycle, further reducing environmental impact.

**Environmental Impact**

The ReTE polyester is designed to break down through a process called hydrolysis, where moisture, heat, and microorganisms in compost cause the material to decompose into water and carbon dioxide<sup>2</sup>. This process significantly reduces the environmental footprint compared to traditional polyester, cutting CO2 emissions by 40% during disposal<sup>2</sup>. By encouraging customers to return used products for composting, Craftevo is actively promoting a circular economy and reducing landfill waste<sup>2</sup>.

**Market Presence**

Craftevo has showcased its innovative textiles at various international events, including the Sustainable Fashion Expo and Premier Vision Paris<sup>2</sup>. Their presence at these events highlights

their commitment to leading the charge in sustainable fashion and textile innovation. These platforms have allowed Craftevo to connect with industry leaders, potential partners, and consumers who are passionate about sustainability.

**Future Prospects**

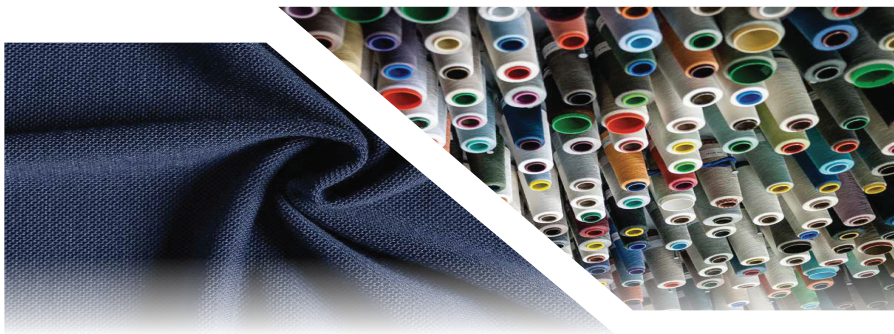
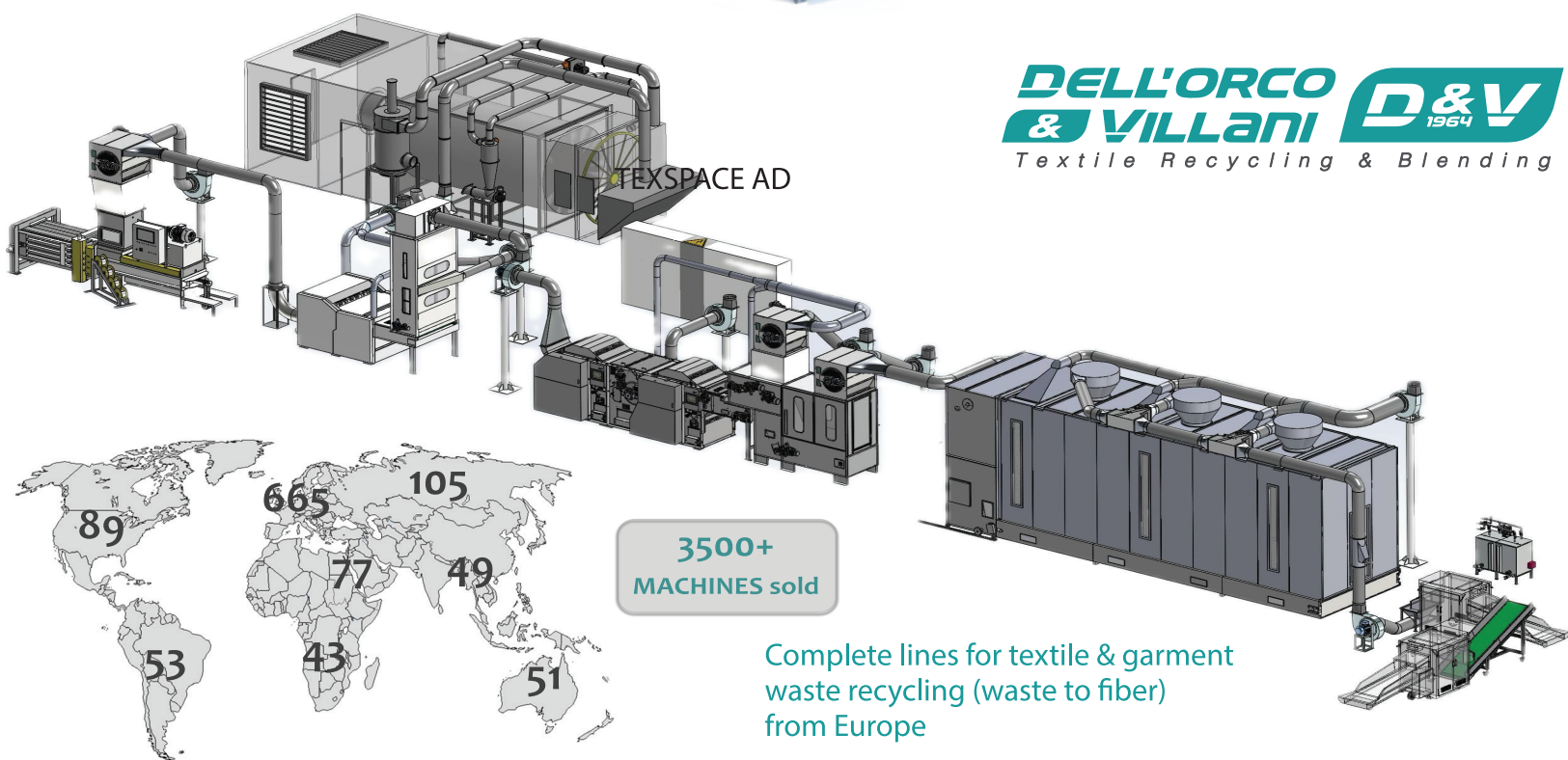
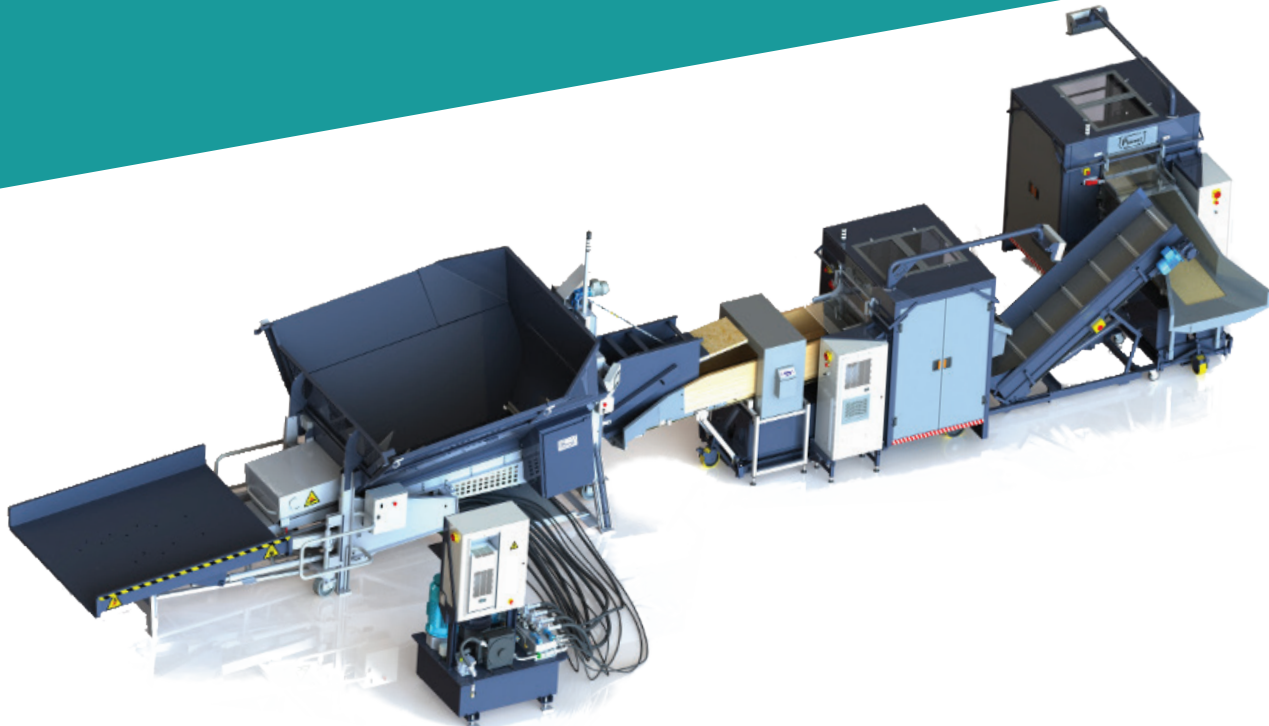
As the demand for sustainable products continues to grow, Craftevo Japan is well-positioned to expand its market reach. Their focus on creating environmentally responsible textiles aligns with global efforts to combat climate change and promote sustainability in the fashion industry. The company plans to continue innovating and expanding its product line to meet the evolving needs of eco-conscious consumers.

For more information about Craftevo Japan and their products, visit their [official website](<https://www.craftevo.com/>)<sup>1</sup>.

Craftevo Japan is setting a remarkable example in the textile industry by combining innovation with sustainability. Their products not only meet the functional needs of consumers but also contribute to a healthier planet. In Bangladesh, RH CORPORATION is offering the products of Craftevo Japan to revolutionize the textile industry of Bangladesh under the umbrella of RH GREEN, for a greener and more sustainable future.



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Photo: Matoha team

## Matoha secures £1.5 million to enhance AI-based material scanning in textile recycling

■ Jack Thompson

***Our technology enables high-speed, accurate fiber detection at the point of sorting. This is a game changer for textile circularity,” said a spokesperson from Matoha.***

UK-based tech startup Matoha has successfully raised £1.5 million in a recent funding round to accelerate the development of its AI-powered material identification scanners. The funding will support the firm’s mission to make textile recycling smarter, faster, and more efficient.

Matoha’s portable scanners use artificial intelligence and near-infrared (NIR) spectroscopy to identify material composition in garments and fabrics instantly. This breakthrough technology is designed to tackle one of the fashion industry’s most demanding challenges:

accurately sorting complex textile blends for recycling.

With textile waste growing rapidly and less than 1% of discarded garments being recycled into new clothes, Matoha’s innovation is seen as a vital tool in pushing the fashion industry towards a circular economy. The funding round was led by impact-driven investors and cleantech supporters. Matoha plans to use the capital to scale production, expand into global markets, and continue refining the AI algorithms that power its scanners.

The startup is already working with recyclers, sorters, fashion brands, and research institutions across Europe and beyond. As regulators and brands push for more sustainable waste management in fashion, Matoha’s AI-driven material scanners may become an essential link in the recycling supply chain.



# Syre launches gigascale textile recycling plant in Vietnam

■ Harry White



**Photo:** Syre signs MoU with Binh Dinh Province of Vietnam with intention of establishing Gigascale recycling

Syre, a next-generation textile recycling company, has announced plans to build a gigascale recycling facility in Binh Dinh, Vietnam. This plant aims to process hundreds of thousands of tonnes of textile waste annually, with a focus on mechanically and chemically recycling polyester and cotton blends.

The facility is being developed in partnership with local Vietnamese authorities and global apparel brands committed to circularity. Once operational, it will be one of the largest textile recycling plants in Southeast Asia, positioning Vietnam as a critical node in the global recycling supply chain.

Syre's approach includes integrating

automated sorting, fiber identification via spectroscopy, and depolymerization units. The goal is to recover textile-grade raw materials at commercial scale and feed them back into the global garment manufacturing system. The investment is backed by global impact investors and sustainability-focused funds, who see textile recycling as a key growth frontier. The plant is expected to be fully operational by late 2026 and serve as a model for replication in other key textile hubs. By reducing dependence on virgin materials and preventing textile landfill waste, Syre's initiative could significantly accelerate progress toward a global circular textile economy.

# EU mandates separate textile waste collection by 2025

■ Daniel Brown



The European Union has mandated that all member states establish separate textile waste collection systems by January 1, 2025. This directive, a component of the EU Waste Framework Directive, marks a major regulatory milestone aimed at reducing the environmental burden of textile consumption.

Currently, over 5 million tonnes of textiles are discarded annually in the EU, with only a small fraction being recycled. Much of the waste ends up in landfills or is incinerated, leading to significant greenhouse gas emissions and resource loss. The new directive seeks to change that by enabling better sorting, reuse, and recycling of post-consumer textiles.

Member states are now in a rush to establish national-level infrastructures,

including drop-off centers, extended producer responsibility (EPR) schemes, and sorting facilities. The legislation also encourages partnerships between local governments, recyclers, and brands to create circular systems. To support this transition, the EU is funding R&D initiatives focused on textile sorting technologies, fibre-to-fibre recycling innovations, and digital product passport systems. Brands operating in the EU are being asked to label garments more transparently and design with recyclability in mind.

Industry experts applaud the policy shift but caution that implementation gaps—particularly in newer EU states—may slow down the intended impact. Still, the move is seen as a clear signal to the global fashion industry that regulatory pressure for circularity is intensifying.



# Kering launches industry-first water strategy

■ Matthew Davis



Kering, the French luxury group behind brands like Gucci and Balenciaga, has introduced the fashion industry's first comprehensive water strategy. The initiative aims to reduce water consumption, improve watershed resilience, and promote responsible water use across its global supply chain. This bold move comes amid increasing scrutiny of fashion's water footprint, particularly in dyeing and finishing stages.

The strategy rests on three pillars: regenerative raw material sourcing, water stewardship in production zones, and consumer-facing transparency. Kering plans to establish water resilience labs in ten key freshwater basins globally by 2035. These labs will facilitate collective action with local

communities, suppliers, and NGOs to improve water quality and availability.

Kering is also integrating water-related metrics into its Environmental Profit and Loss (EP&L) accounting system to quantify and communicate water-related risks and progress. This initiative aligns with the Science-Based Targets for Nature (SBTN), making Kering one of the first companies to adopt nature-based accounting on water. By becoming water-positive by 2050, Kering aims to not only reduce environmental impact but also secure long-term supply chain resilience. Experts argue that such holistic strategies are essential as climate change intensifies water scarcity, particularly in manufacturing hubs like South Asia.





# Bangladesh's textile waste crisis spurs recycling push

■ Luke Wilson

Bangladesh, the second-largest apparel exporter globally, is facing a mounting textile waste crisis, generating nearly 577,000 metric tons of waste annually. The vast majority of this waste originates from pre-consumer sources like cutting scraps and defective garments. Unfortunately, much of this is either exported at low prices, dumped in landfills, or incinerated, contributing to severe environmental degradation and missed economic opportunities.

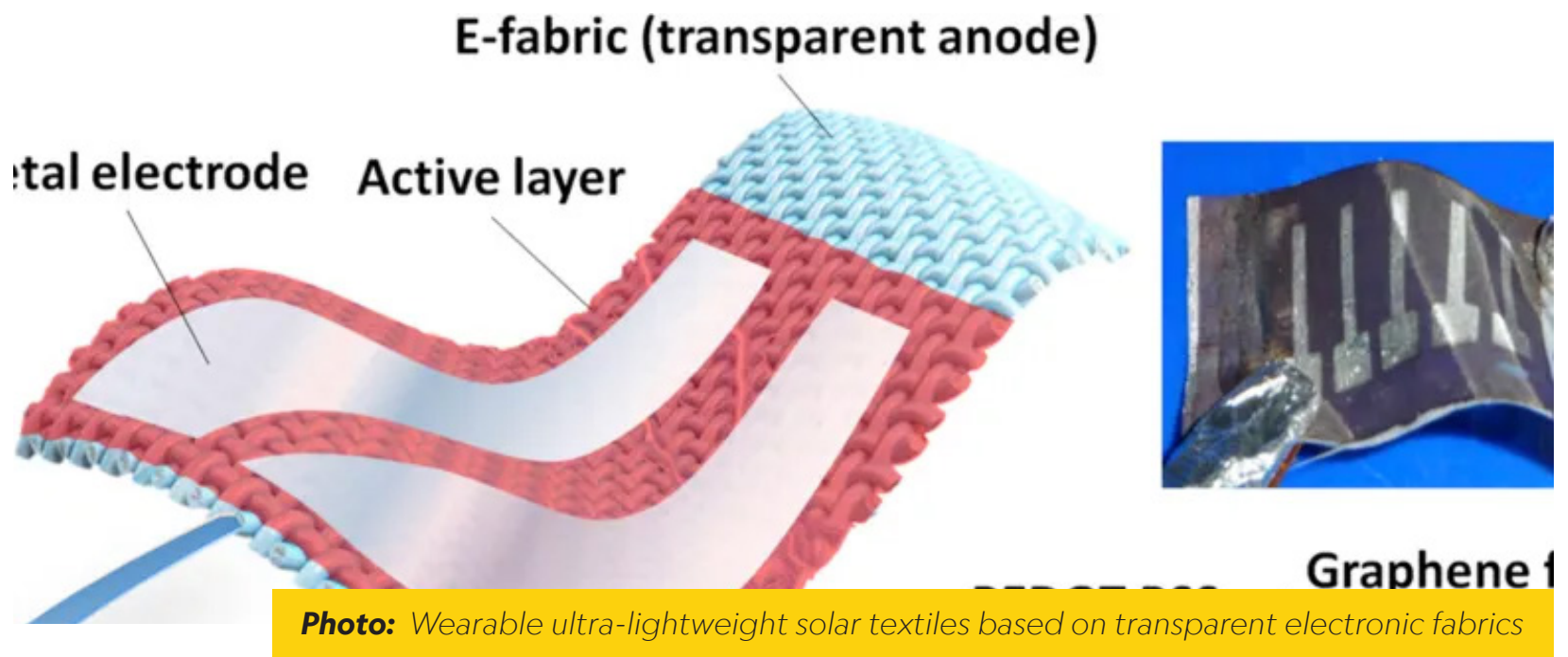
The domestic recycling ecosystem remains underdeveloped due to a lack of investment, technological constraints, and limited awareness among manufacturers. However, a shift is underway. Industry stakeholders, startups, and global investors are now focusing on converting textile waste into a circular economy opportunity. Notable players like Recycle Raw and Broadway Regenerated Fiber

are investing in localized recycling infrastructure, including mechanical and chemical recycling techniques.

Experts highlight that for Bangladesh to fully harness the potential of textile-to-textile recycling, there must be coordinated policy support, financial incentives, and stronger buyer-supplier collaboration. The EU's due diligence laws and brand-level circularity commitments are pressuring Bangladeshi exporters to demonstrate traceable, low-waste practices. Local efforts are also being bolstered by international NGOs and development partners like GIZ and H&M Foundation, which are funding pilot projects and research into scalable solutions. If Bangladesh can formalize waste collection, invest in scalable recycling facilities, and embed circular practices across its supply chain, the country can position itself as a global leader in sustainable apparel manufacturing.

# Solar cell fabrics open new chapter in wearable energy

■ Oliver Taylor



The line between fashion and function is blurring further with the development of solar cell fabrics—textiles embedded with photovoltaic elements that generate electricity from sunlight. From outdoor sportswear to military uniforms and refugee shelters, the applications of energy-harvesting garments are expanding rapidly.

These smart fabrics incorporate flexible, lightweight solar modules laminated or woven directly into the fabric. Innovations in organic photovoltaics (OPVs) and dye-sensitized solar cells (DSSCs) have enabled fabrics that are washable, breathable, and capable of producing up to 200 mW of power per square meter.

For example, a jacket fitted with solar panels can charge a smartphone in four hours of sunlight—particularly useful for remote or off-grid environments. Military

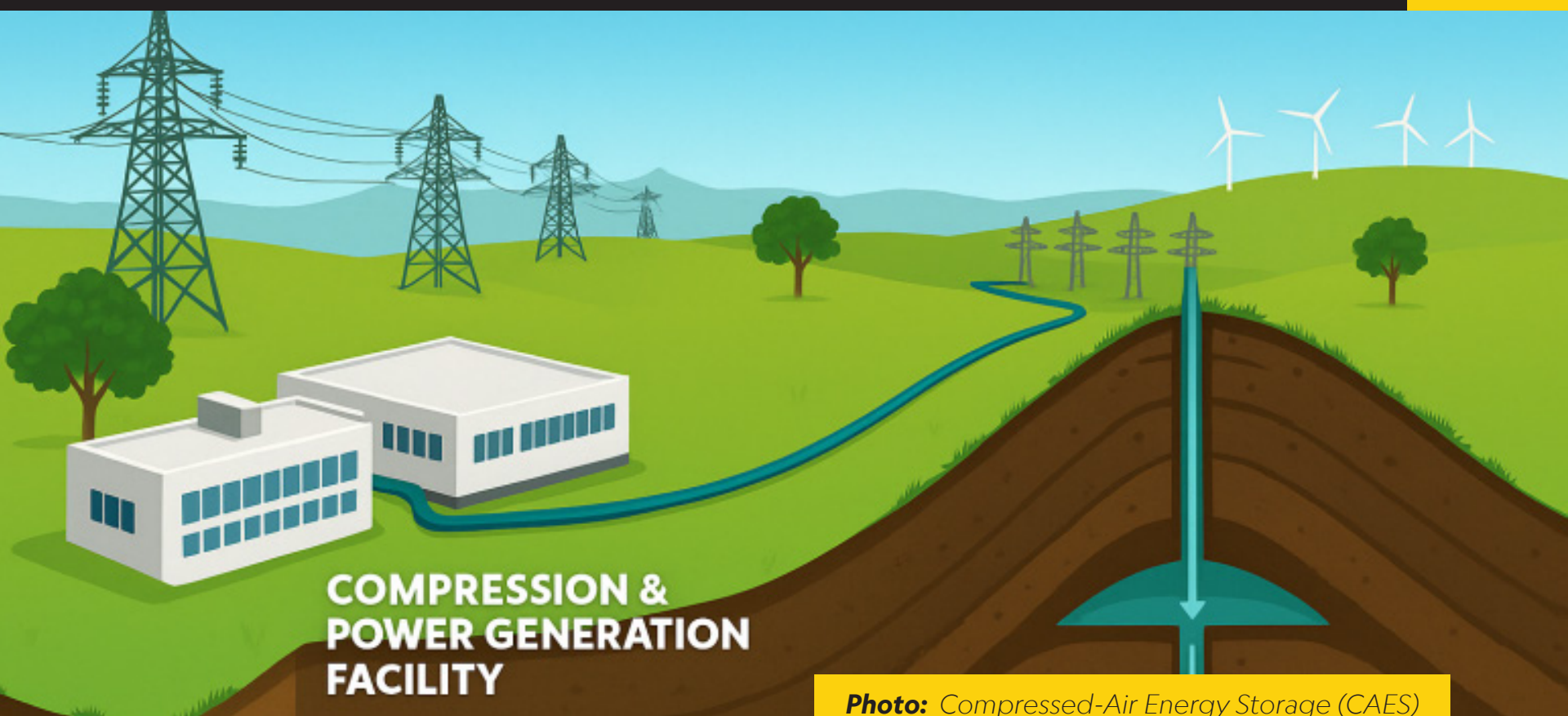
forces and first responders are testing solar backpacks and vests that power communication devices and sensors.

In the commercial sector, startups like Soliyarn and Powerweave are working on athleisure garments that integrate energy storage, GPS tracking, and temperature regulation. These products target adventure athletes, logistics workers, and tech-savvy consumers.

For the textile industry, solar fabrics also open doors to a new revenue stream: “functional fashion.” Apparel brands are now exploring capsule collections featuring solar accessories, charging pouches, and commuter-friendly wearables.

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**Photo:** Compressed-Air Energy Storage (CAES)

## China scales up Compressed-Air Energy Storage (CAES)

■ Daniel Brown

China, the world's largest energy consumer and greenhouse gas emitter, is rapidly scaling up its investment in Compressed Air Energy Storage (CAES), signaling a strategic shift in the nation's renewable energy strategy. The deployment of CAES, a lesser-known but highly promising energy storage technology, is poised to play a pivotal role in stabilizing China's vast and increasingly volatile renewable energy grid—particularly as wind and solar power scale to record highs. This move aligns with China's broader commitment to peak carbon emissions before 2030 and achieve carbon neutrality by 2060. As of early 2025, several gigawatt-scale CAES plants are either under construction or in the planning stages across various Chinese

provinces, including Jiangsu, Hebei, and Inner Mongolia.

### What is Compressed Air Energy Storage?

Compressed Air Energy Storage is a mechanical storage system that stores energy by using electricity to compress air and inject it into underground caverns or purpose-built tanks. When electricity demand rises, the pressurized air is released, heated (often using waste heat or renewable thermal energy), and then passed through turbines to generate electricity. The process is analogous to a rechargeable battery but operates at grid-scale with massive storage potential.

Compared to traditional lithium-ion batteries, CAES offers several key



advantages:

- Long-duration storage (ranging from 4 to 24+ hours)
- Lower cost per kWh for large-scale deployment
- High cycle life with minimal degradation
- Use of abundant and non-toxic materials

### China’s Latest Breakthroughs

In July 2023, China inaugurated what is currently the world’s largest CAES facility—the Zhongyuan Salt Cavern CAES Plant in Henan Province. Built by China Energy Engineering Corporation (CEEC) and State Grid Corporation, the plant has a design capacity of 300 MW/1,800 MWh, enough to power approximately 150,000 homes for six hours.

By early 2025, the project has already demonstrated its ability to reduce peak loads, integrate renewable energy from nearby solar farms, and stabilize frequency and voltage levels in the local grid. Engineers estimate it reduces coal usage by over 100,000 tons per year, cutting emissions by more than 200,000 tons of CO<sub>2</sub>.

Another major development is underway in Hebei province where a 600 MW CAES plant—backed by China Huaneng Group—is being built inside a repurposed salt mine, combining deep geological engineering with renewable power synergy. Scheduled for partial operation by late 2025, it is projected to be the largest long-duration energy

storage facility in Asia.

### Strategic Drivers Behind the Surge

**1. Grid Decarbonization Goals:** China is adding wind and solar capacity at an unprecedented pace—installing over 200 GW of renewable power in 2023 alone. However, grid integration remains a critical challenge due to the intermittent nature of renewables. CAES is emerging as a viable solution for storing excess renewable power during off-peak hours and discharging it during peak demand.

**2. Geological Advantage:** China possesses vast underground salt caverns, depleted gas fields, and suitable hard rock formations ideal for CAES development. This natural endowment makes it cost-effective and scalable for the country to implement the technology.

**3. Policy Push and Investment:** The Chinese government has designated long-duration energy storage as a “strategic emerging industry” under the 14th Five-Year Plan. Substantial subsidies, land-use incentives, and R&D grants have been directed toward CAES and other storage technologies.

**4. Energy Security:** With growing concerns over energy imports and fossil fuel dependency, CAES provides a domestic, safe, and long-term backup system for the grid, improving national energy security.

### Challenges and Technological Innovations

Despite its promise, CAES faces several hurdles:

• **Efficiency Losses:** Traditional CAES systems have a round-trip efficiency of 40–60%, lower than lithium-ion batteries (80–90%). However, advanced designs—such as adiabatic CAES, which store the heat generated during compression—can boost efficiency to 70% or higher.

• **High Initial Capital Cost:** Building underground storage caverns and gas turbines requires significant investment. However, China’s economies of scale and experience in large infrastructure projects help mitigate these costs.

• **Heat Management:** Proper integration of waste heat and renewable thermal energy is essential for maximizing performance. Chinese firms like Tsinghua Energy and CRRC are investing in supercritical CO<sub>2</sub> turbines and thermal recovery systems to enhance CAES system design.

**Global Implications and Leadership**

China’s ambitious push into CAES is not just about domestic grid balancing—it’s also a bid for global leadership in clean tech exports. Just as it leads the world in solar panels and EV batteries, China aims to become a hub for exporting CAES systems, especially to countries in Africa, South America, and Southeast Asia where large-scale grid storage is needed but lithium supplies are scarce or expensive. Companies like China National Energy Group and Sungrow Power Supply Co. are already marketing modular CAES units internationally and entering joint

ventures in regions with favorable geological and climatic conditions.

**Future Outlook**

According to a report by the China Energy Research Society, the country is expected to have over 5 GW of CAES capacity installed by 2030, representing around 20% of total long-duration storage capacity. If costs continue to decline and system efficiency improves, CAES could emerge as a mainstream option alongside pumped hydro and next-gen battery storage. Furthermore, integration with hydrogen production is on the horizon. CAES facilities could be co-located with green hydrogen plants, using excess renewable energy during compression to simultaneously produce and store energy, creating a multi-modal energy hub.

**Conclusion**

China’s aggressive scaling of compressed air energy storage signals a transformative phase in its energy transition journey. By marrying renewable power generation with cutting-edge storage solutions, the country is not only fortifying its grid but also setting a new global benchmark for energy innovation. As the world grapples with the dual challenges of decarbonization and energy reliability, China’s CAES model could offer a scalable and sustainable path forward—one powered not just by the wind and sun, but by air itself.

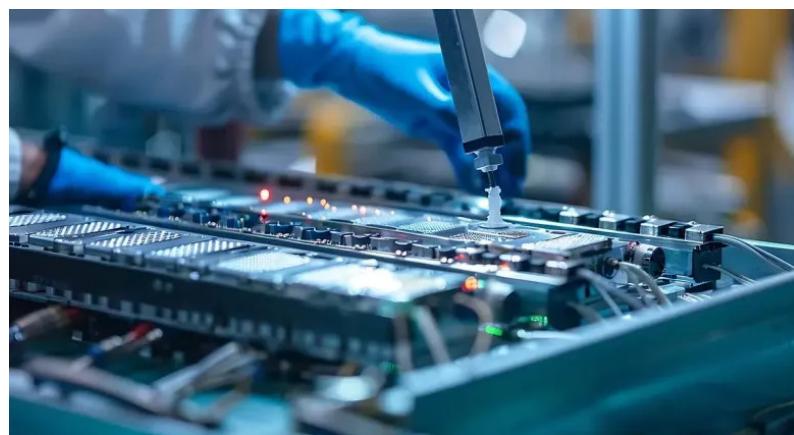
# Sodium-Ion batteries offer hope for sustainable power storage

■ Harry White

In the evolving landscape of energy innovation, sodium-ion batteries are emerging as a promising alternative to lithium-ion, particularly in terms of cost, resource abundance, and safety. At the forefront of this movement is Natron Energy, led by Colin Wessells, which is pioneering commercial production of sodium-ion cells aimed at industrial-scale energy storage.

Sodium, unlike lithium, is plentiful and inexpensive to source. It can be extracted from seawater and salt mines, reducing geopolitical dependencies and environmental degradation linked to lithium mining. Natron's patented Prussian Blue electrode chemistry enables fast charging, stable cycling, and minimal capacity degradation.

This technology is especially relevant for textile factories, which often face unstable grid supply or high peak-demand costs. Sodium-ion batteries can store renewable energy generated from solar panels or wind turbines and release it during production peaks, minimizing reliance on fossil-fuel-based backup systems. Natron's roadmap includes the opening of a gigafactory in Michigan and partnerships with renewable energy



providers and commercial building operators. With high-temperature tolerance and enhanced safety features, these batteries are also ideal for humid or heat-prone manufacturing environments.

The fashion and textile sectors, which are under increasing pressure to reduce carbon emissions and energy footprints, stand to benefit immensely. By adopting sodium-ion storage solutions, manufacturers can ensure energy security while moving toward decarbonization.

As ESG mandates grow stricter and lithium prices remain volatile, sodium-ion technology is gaining traction. While still in its early adoption phase, experts forecast a 300% increase in sodium-ion deployment in industrial zones by 2030. Natron Energy's innovation may thus redefine how the global apparel supply chain stores and manages power.



# True cost of steam: An energy audit across wet processing units in south asia

■ M A Mohiemen Tanim



## Steam—The Hidden Cost Center

In the textile and apparel industry's energy matrix, steam plays a vital but underappreciated role—especially in wet processing units where it powers dyeing machines, dryers, and finishing equipment. While electricity gets most of the attention in energy efficiency initiatives, thermal energy (primarily steam) often accounts for a larger share of both energy use and emissions, particularly in developing markets like Bangladesh, India, and Pakistan.

## How Steam Systems Drain Profits Silently

## The Dominance of Thermal Load

Energy audits across South Asia's textile factories consistently show that steam accounts for 30–40% of total energy use, surpassing electricity in cost intensity in many facilities. Generated by boilers—mostly running on diesel, coal, or furnace oil—steam is distributed across a labyrinth of pipelines to various wet processing points.

## Distribution Losses and Maintenance Gaps

Most factories suffer from outdated infrastructure:

» Uninsulated or degraded steam lines

- » Faulty or absent condensate recovery systems
- » Over-designed boilers running below capacity
- » Manual blowdown procedures causing excessive purge losses

Such issues result in distribution losses of 12–20% and boiler efficiencies falling below 70%, far from the 85%+ levels cited in equipment brochures.

### What the Data Tells Us

A 2024 multi-country audit (conducted by sustainability programs like IFC PaCT, GIZ FABRIC, and independent energy firms) found the following average metrics in wet processing factories:

| Indicator               | Observed Range | Industry Best Practice  |
|-------------------------|----------------|-------------------------|
| Boiler efficiency       | 63–72%         | 85%                     |
| Condensate recovery     | <45%           | >80%                    |
| Flue gas temperature    | >200°C         | <150°C with economizers |
| Steam loss in pipelines | 12–20%         | <5%                     |
| Fuel overconsumption    | 15–30%         | 0–5%                    |

These inefficiencies translate into \$10,000–\$25,000/month in excess energy spending for mid-size units (25–40 tons/day), and hundreds of tons of avoidable CO<sub>2</sub> emissions.

### Financial Anatomy of Steam

Let’s take a factory processing 30 tons of fabric/day using a 2-ton/hr diesel-

fired boiler.

### Monthly Cost Breakdown:

- » **Diesel Consumption:** ~1,100 liters/day
- » **Fuel Cost:** ~\$36,000/month
- » **Boiler Maintenance & Downtime:** ~\$2,000
- » **Water Treatment & Chemicals:** ~\$1,500
- » **Effective cost per ton of processed fabric from steam input alone:** ~\$44–\$48/ton

In many cases, factories spend 10–15% more than necessary due to inefficiencies—without realizing it.

### Recovery Levers and Payback Models

Factories often overlook cost-effective interventions. Based on empirical data from implemented projects:

### High ROI Interventions

| Solution                       | Savings                      | Payback     |
|--------------------------------|------------------------------|-------------|
| Condensate recovery system     | 15–25% fuel saved            | <12 months  |
| Flash steam recovery unit      | 8–10% latent energy captured | 6–10 months |
| Boiler sequencing & automation | 5–8% fuel reduction          | <1 year     |
| Economizer on flue gas line    | 6–10% improvement            | ~18 months  |

Despite the savings potential, adoption remains low due to lack of awareness and fragmented ownership structures in



many factories.

## Electric Boilers—A Paradigm Shift or Niche Fix?

Electric steam generators (resistance or electrode types) are gaining traction—especially in facilities with solar power or stable grid access.

### Benefits:

- » 95–99% thermal efficiency
- » No flue gas = zero local air emissions
- » Easier automation and digital control
- » Compact footprint

### ROI Case Study: Electrode Boiler Retrofit

- » CapEx: \$35,000
- » Monthly fuel savings: ~\$6,000
- » CO<sub>2</sub> emissions cut: ~18 tons/month
- » Payback: ~2.3 years (shorter with rooftop solar offsets)

### Barriers:

- » High upfront cost for small factories
  - » Electricity tariff volatility
- Grid reliability issues in certain zones
- » Still, in regions with rising fuel prices and falling solar costs, electric boilers are approaching economic parity.

## Strategic Implications for the Textile Industry

### Buyer & Brand Pressures

Global fashion brands are beginning to

require Scope 1 emission disclosures, which include on-site fuel combustion—like steam generation. Factories unable to show carbon intensity reduction risk:

- » Losing preferred supplier status
- » Disqualification from “green” financing
- » Reputational damage in ESG reporting

### Compliance and Financing Opportunities

- » Programs like Bangladesh’s BIIDF, India’s UDYOG RATH, and Pakistan’s NEECA are offering subsidies, matching grants, or low-interest loans.
- » IFC’s Sustainable Energy Finance (SEF) toolkit also supports energy-efficient steam systems.

### Steam Optimization Is No Longer Optional

Steam represents one of the most under-audited and under-optimized cost centers in textile manufacturing. The combination of:

- » Rising fuel prices
- » Emission compliance pressure
- » Energy inefficiency
- » Available technologies

...makes this the right time to rethink steam.

Factories that embrace energy audits, invest in recovery, and pilot electrification will not only reduce costs, but also future-proof themselves in an increasingly sustainability-driven supply chain.

# Low carbon thermal energy roadmap released

■ Jack Thompson



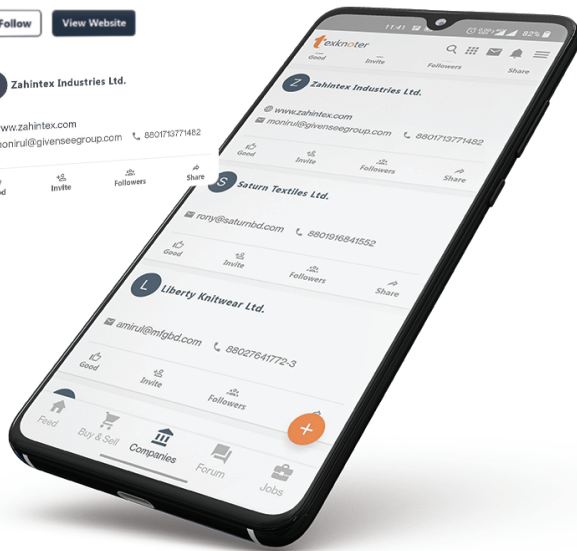
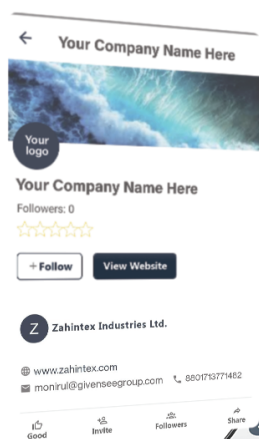
The Apparel Impact Institute (Aii) has unveiled a comprehensive roadmap detailing the textile industry's transition to low-carbon thermal energy. Thermal processes, including dyeing, drying, and finishing, account for more than half of the industry's GHG emissions. The roadmap outlines scalable solutions and investment pathways to help stakeholders decarbonize these high-energy processes.

Key recommendations include fuel switching from coal to biomass and natural gas, deploying solar thermal systems, and integrating heat recovery technologies. The roadmap also calls for increased adoption of digital process monitoring and AI-enabled energy management systems.

According to Aii, industry-wide decarbonization of thermal energy could reduce emissions by 49% by 2030 if implemented at scale. However, the roadmap acknowledges substantial barriers such as capital investment gaps, lack of technical capacity in SMEs, and policy inertia in key manufacturing countries. The initiative is supported by global brands and multilaterals, including Target, PVH, HSBC, and the Clean Energy Investment Accelerator. Pilot projects are already underway in Bangladesh, Vietnam, and India. The report urges governments to integrate thermal decarbonization into national climate strategies and offer fiscal incentives for early adopters.



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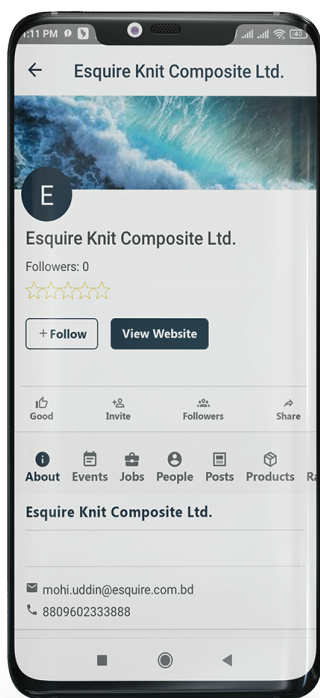
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