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W4TEX women textile

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W4TEX: Strengthening Women's Representation in Senior Textile Positions

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THE SWEDISH SCHOOL OF TEXTILES UNIVERSITY OF BORÅS · civitta · meus · Cámara Official Spanish Chamber of Commerce in Belgium and Luxembourg · KAINOTOMIA · LOTTOZERO

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Green Technologies In The Textile Industry

Introduction

Global pollution, natural resource depletion, and global warming are prompting society to seek healthier living choices and actively support greener lifestyles.

This shift in attitude is particularly evident in the textile industry, which has been known for its detrimental impact on the environment. Notably, the **global clothing and footwear industry is responsible for approximately 4.5 billion tons of CO_2 equivalent emissions**, accounting for 8-10% of total global CO_2 emissions [1]. Therefore, the fashion industry is a far more detrimental contributor to environmental degradation than the aviation industry, due to its extensive use of energy, water, and chemicals.

In response to the existing challenges, **green technologies are more commonly used in the textile industry as a promising solution to** transform the way we live, work, and interact with our environment. Green technologies are environmentally responsible solutions that support sustainable economic growth while benefiting society. Also called clean technologies, **these innovations help protect our planet by focusing on two core principles:**

- **Sustainability**: Meeting current needs (like energy or materials) without harming future generations.
- **Circularity**: Reusing resources repeatedly (like recycling materials or repurposing waste) instead of using them once and throwing them away.

For example, green technologies include solar panels that generate clean energy, systems that recycle water in factories, or biodegradable materials that replace plastic. By reducing waste, cutting pollution, and using renewable resources, these technologies help businesses grow while also protecting the environment.

Green technology is more than a trend - it is a clear business strategy that can provide tangible benefits for business owners. These technologies are available for businesses of all sizes, offering long-term advantages. This unit will focus on providing an overview of some of the most typical green technologies and opportunities for SMEs to integrate them into their operations.

Global Initiatives Driving Sustainability

The need for sustainable solutions in the textile industry is evident across various levels, starting with government initiatives and extending to businesses and individuals. In the past three decades, protecting the global environment has emerged as one of the major challenges in international relations.

To address environmental policy gaps, global initiatives such as **the Paris Climate Agreement** [2]**, the European Green Deal** [3]**,** and **the United Nations Sustainable Development Goals** [4] have been developed. These frameworks provide a foundation for a more sustainable future, with specific attention given to industries like textiles. Building on these global efforts, the **textile industry has seen significant policy developments since 2022**, particularly within the EU, focusing on reducing environmental impact, improving labour conditions, and promoting circularity. For example, the **EU Strategy for Sustainable and Circular Textiles** [5] proposes actions for the entire lifecycle of textile products, supporting green and digital transitions. Additionally, the EU is developing a **Transition Pathway for the Textile Ecosystem** [6], which aims to guide the sector toward sustainability, innovation, and social goals while ensuring competitiveness and resilience.

Specific Regulations In The Textile Industry

Today, companies in the textile industry must comply with key sustainability regulations, which include:

- The Eco-design and Sustainable Products Regulation (ESPR) [7]
- The Corporate Social Due Diligence Directive (CSDDD) [8]
- The Corporate Sustainability Reporting Directive (CSRD) [9]

Starting from 2024, the **EU's Digital Product Passport** [10] regulation is driving the transition to a circular economy, requiring businesses to provide detailed product information via a unique identifier (UID) such as an RFID or QR code. This passport will include data on raw materials, manufacturing, usage, repair, and recycling, empowering both businesses and consumers to make informed, sustainable choices.

As access to such detailed product information expands, consumer **behaviour is also shifting toward sustainability**. A new study by Bain & Company shows that half of **consumers worldwide now consider sustainability a top priority when buying products**, with many willing to pay 12% more for eco-friendly options due to growing environmental concerns [11]. This shift suggests that companies that adopt sustainable practices could unlock significant profit opportunities by meeting this growing demand.

Circular Business Models: How to Get Started

Clothing accounts for over 60% of total textile usage. Over the past 15 years, **global clothing production has nearly doubled**, while the **actual use of clothing has declined by almost 40%** [12]**.** Both developments are mainly due to the 'fast fashion' phenomenon, with a quicker turnaround of new styles, an increased number of collections offered per year, and often, lower prices.

The **current clothing system follows a linear model of production, distribution, and use**. This approach wastes economic potential, strains resources, harms ecosystems, and generates widespread negative social and environmental impacts at all levels. Thus, there is a strong need **to move away from the linear operating model of fast fashion and embed the concept of circularity** in the textile industry

Circular Business Models (CBM) in the textile industry minimise waste by keeping materials in continuous use through recycling, upcycling, rental services, and resale platforms. **To enable these closed-loop systems, businesses integrate green technologies** specifically designed for circularity, such as mechanical recycling systems that regenerate fibres without pollution, AI-driven tools to identify reusable materials, or 3D virtual pattern-making software. **These innovations help companies keep valuable resources in use longer while reducing trash headed to landfills, creating business models that are both good for the planet and financially sustainable.**

Such an approach also allows the industry to reduce the number of new products manufactured while maintaining profitability and meeting the demands of a growing consumer base. Ultimately, CBMs align with the broader principles of a circular economy, where systems and services are designed to keep resources in use for as long as possible, extract maximum value from them, and regenerate products and materials to reintroduce them into the cycle after their initial end of life.

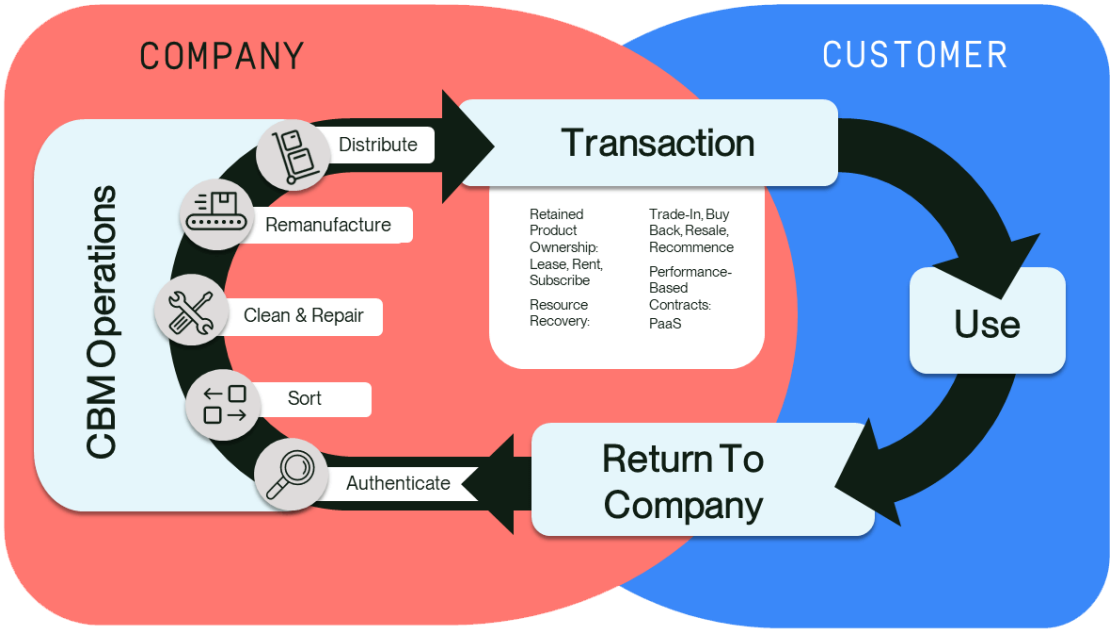

Fig. 1. A Circular Business Model
Source: created by the authors based on (Circular Business Models,2025)

Circular business models in the textile industry can be implemented through four main approaches [13]**:**

- **Reuse and take-back model** | This approach begins with establishing a convenient collection system for used clothing from customers, often incentivised through take-back schemes. For example, companies may offer discounts on future purchases in exchange for returned garments, encouraging customer participation. Once collected, the items undergo careful sorting and condition assessment to determine their potential for further use. Meanwhile, garments that cannot be restored are sent to recycling partners to be transformed into new materials. This process extends the lifecycle of textiles, reduces the need for virgin materials and minimises waste. Brands like H&M have already implemented similar garment collection and recycling programs, showcasing the effectiveness of these circular strategies.
- **Circular supply chains model |** This model promotes sustainability by using recycled or biodegradable materials, ensuring they can either re-enter production or safely return to the environment, creating a closed-loop system. For example, instead of relying on new, raw materials, businesses source recycled fabrics or biodegradable fibres that can break down naturally without harming the environment. Additionally, companies design their products and processes so that materials can be easily recovered, reprocessed, and reintroduced into the supply chain, creating a continuous cycle of use and reuse. Companies such as the Dutch fashion brand MUD Jeans are leaders in this area, offering products that can be fully recycled into new products.
- **Repair model |** This model offers consumers a repair or alteration service to extend the active life of their clothing. Instead of discarding old or damaged items, businesses offer repair services, extending the lifespan of garments. For example, Patagonia's Worn Wear program encourages extended product life and reduces consumption by offering customers a platform to trade in, repair, and buy used Patagonia gear. Retailers and brands can offer this as a revenue-generating add-on service to build ongoing relationships with customers, leading to brand loyalty. There is also the opportunity to upskill customers to carry out repairs through workshops and online tutorials, enhancing customer experience and loyalty.
- **Rental and subscription model |** In this model, customers can rent everyday clothing or subscribe to seasonal fashion collections. Businesses provide access to products without the need for ownership. For example, Rent the Runway, an online platform, lets users rent, subscribe to, or purchase designer clothing and accessories. Customers pay for the experience of wearing the items rather than owning them. After use, the items are returned, cleaned,

repaired if needed, and reused, which cuts down on waste and extends the lifespan of the clothing.

Numerous innovative approaches are embracing various circular strategies. **The choice of the model to implement depends on the unique characteristics and objectives of the business**. When applied effectively, Circular Business Models (CBMs) can enable businesses to continue growing while reducing their reliance on scarce and finite resources.

Innovative Technologies for Sustainable Textile Production

Any textile production might become more sustainable through the use of various innovative materials and green technologies. The section below outlines a variety of solutions, including simple, budget-friendly green technologies suitable for small businesses and individual entrepreneurs, as well as more advanced options for those with larger budgets.

1. Sustainable Materials

Implementing green technologies in textile production starts with selecting sustainable materials. Sustainable materials are a cornerstone of the green economy, offering small businesses an accessible entry point into eco-friendly practices. Unlike complex technologies, materials like organic cotton, hemp, or recycled polyester require minimal upfront investment, allowing businesses to reduce their environmental footprint while meeting consumer demand for ethical products.

Traditional fabric materials used in fashion include conventional cotton and polyester, which are very destructive to the environment. Therefore, with the growing consumer trend of seeking more sustainable products, more and more **brands are moving forward to traditional eco-materials** which include but are not limited to certified organic cotton, locally produced linen, recycled polyester, organic wool, hemp, and bamboo.

Hemp | Hemp fabric is popular for its high durability, excellent resistance, sustainability, and water-saving properties. However, some hemp fabrics can be a bit rougher and stiffer.

	**Organic cotton |** While hemp fabric is valued for its durability and sustainability, organic cotton offers superior softness and comfort, making both materials suitable choices, depending on the desired qualities.
	**Locally produced linen |** Linen textiles, known for their luxurious, airy feel in the summer and superior quality, are somewhat costlier than cotton but definitely cheaper than silk.
	**Recycled polyester |** While recycled polyester is a popular choice for many brands due to its affordability and widespread availability, it is important to note that clothing made from this material can still release microfibers during washing.

Table 2. Four sustainable materials (hemp, organic cotton, locally produced linen, recycled polyester)

With many options available, the challenge for businesses lies in carefully evaluating their choices to avoid poor fabric selection and align with their sustainability goals.

2. Eco-Friendly Production Technologies

The textile industry is one of the most resource-intensive sectors, with traditional dyeing and washing processes consuming vast amounts of water and generating significant pollution. **Eco-friendly production technologies, like waterless dyeing, natural dyes, water recycling, and zero-water washing systems, provide innovative solutions for businesses** to reduce environmental impact while maintaining efficiency.

- **Waterless Dyeing Technologies |** Waterless dyeing technologies, such as air dyeing or CO_2 dyeing, eliminate the need for water in the textile dyeing process. These methods use gases or air to transfer dyes onto fabrics, **significantly reducing water consumption and pollution**. Manufacturers can incorporate waterless dyeing by partnering with manufacturers like DyeCoo [14], which uses supercritical CO_2 to dye synthetic fabrics without water. This collaboration allows access to advanced technology without high costs. Additionally, **foam dyeing** [15] applies dyes using foam as a medium, reducing water usage and

improving dye fixation, while **plasma dyeing** [16] uses ionised gas to modify fabric surfaces and apply dyes, further minimising water and chemical usage. Another advanced dyeing technology is the usage of **membrane filtration** [17]. Gradual investment in modular or small-scale equipment helps businesses test and scale the technology as they grow**.**

- **Natural Dye Usage |** Textile companies can incorporate natural dyes by starting small and utilising local, cost-effective resources like **turmeric, beetroot, or onion skins**, which are both eco-friendly and accessible. For example, companies like Tintex Textiles [18] in Portugal and Fili Pari [19] in Italy have successfully developed innovative natural dye solutions, such as dyes from mushrooms, plants, and even marble-based fabrics, showcasing the potential of sustainable practices. **To implement natural dyeing, textile companies should experiment with small-scale production, test local dye sources, and gradually scale up**.
- **Water Recycling Technologies |** The adoption of water recycling technologies is crucial, especially in regions facing water scarcity. Even though the initial investments can be high, recycling water can significantly lower freshwater consumption, helping to **save up to 30-40% on the water bills** [20]. There is a possibility to start with simpler, low-cost systems like **greywater recycling** [21] **or rainwater harvesting** [22], which require minimal infrastructure. For example, a basic rainwater harvesting system can be installed for a few thousand dollars, depending on the size and complexity. In the EU, some SMEs have adopted rainwater harvesting systems to supplement their water needs, particularly in water-stressed regions, demonstrating that even modest investments can produce significant savings.
- **Zero-Water Washing Systems |** Zero-water washing systems offer innovative solutions that **completely eliminate water usage in cleaning and processing.** SMEs in Europe, where water conservation is a growing priority, can integrate these systems to meet strict sustainability regulations and appeal to eco-conscious consumers. Technologies such as **laser finishing** [23], which uses lasers to distress or soften fabrics, and **ozone-based cleaning** [24], which disinfects and cleans materials without water, are available for businesses.

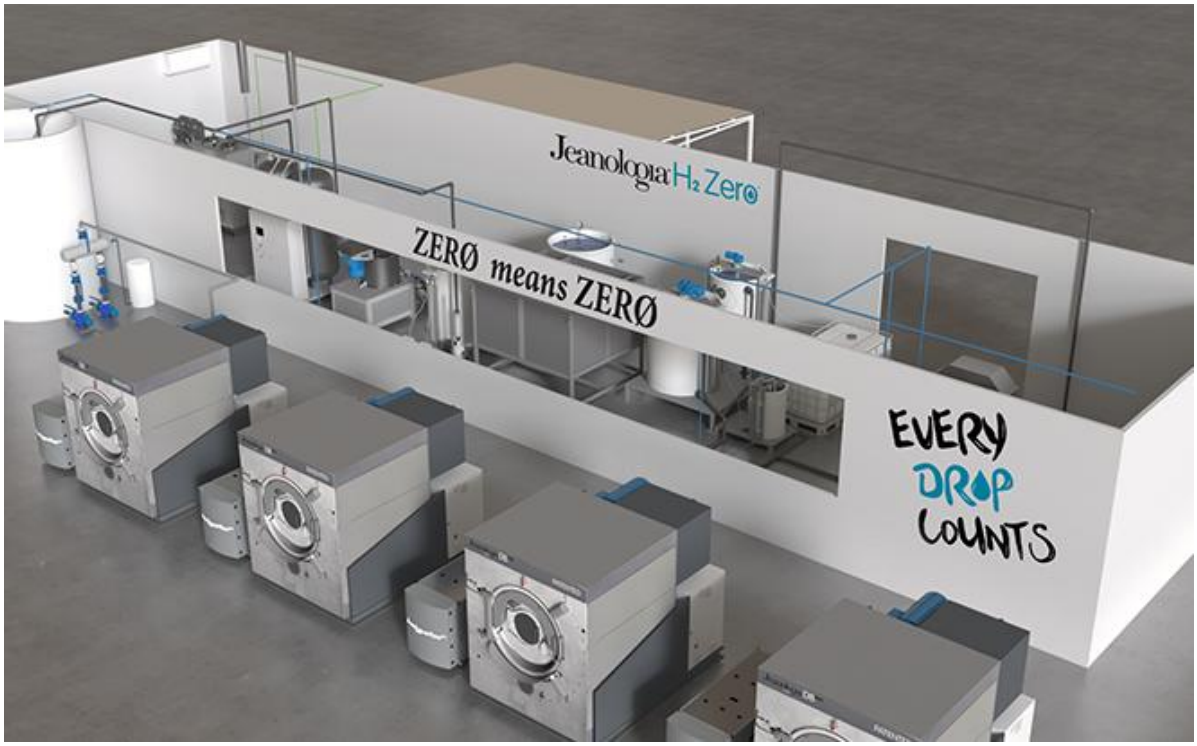

Fig. 2. H2Zero - Zero-Water Washing Systems
Source: Zero Waste Water Technology. H2 Zero. Jeanologia. (2024, June 17)

To truly benefit from cost reduction and other economic advantages, such as saving up to 30-40% on water bills, collaborating with professional consultants, especially in the early stage of the business, is key to success. They help navigate initial investments and ensure technologies like waterless dyeing, natural dye usage, water recycling, and zero-water washing systems are implemented effectively for maximum efficiency and compliance.

3. Energy Efficiency Technologies

The **six key challenges of the 21st century tied to green technologies** are energy saving, energy consumption, green production, green products, and sustainable production [25]. Energy efficiency in any business is about **using less energy to perform the same tasks** without compromising productivity or quality.

Basic Solutions | Some technologies are easier to implement initially, while others may require more advanced planning and investment. Easier-to-implement solutions will be proposed first, followed by more advanced options.

- **Led Lighting Modernisation |** Upgrading to LED lighting is a practical step for businesses to reduce energy costs and consumption by up to 65% [26]. LEDs not only lower expenses but also create a welcoming atmosphere, making them an ideal choice for companies focused on sustainability and efficiency. Their

longer lifespan compared to traditional bulbs further reduces maintenance costs over time. To start saving energy and cutting maintenance expenses, businesses can begin by replacing old incandescent or halogen bulbs with retrofit LED lights. LEDs offer the same brightness as incandescent bulbs but consume less energy; for example, **a 25W LED bulb delivers the same brightness as a 40W incandescent bulb**.

- **Motion Sensor Lights Installation |** A Motion Sensor is an electrical device that detects movement and turns it into an electrical signal that can control different systems or devices. For example, motion sensors can automatically turn lights ON or OFF based on whether there are people in the room, activate security alarms, record video for surveillance and adjust air conditioning to save energy. Besides the fact that **motion sensors help to avoid the risk and expense of using energy when not needed**, they are simple and cost-effective in installation and maintenance.
- **Ventilation Optimisation |** SMEs adopting ventilation optimisation have achieved cost reductions of up to 15-25% on energy bills, according to the "Challenges and opportunities for improving energy efficiency in SMEs: learnings from seven European projects" study [27]. Therefore, optimising ventilation is an effective way to reduce costs while also improving air quality. There are many different options available for SMEs, such as **energy-efficient fans, heat recovery systems, and smart ventilation controls**. Businesses can also incorporate **demand-controlled ventilation**, which adjusts airflow based on occupancy, or natural ventilation solutions like strategically placed windows and vents.

Modernising LED lighting, optimising ventilation systems, and installing motion sensor lights are effective steps, but their success depends on **regular technical maintenance**, which is essential for keeping energy-efficiency technologies running smoothly in companies. For instance, cleaning or replacing filters in ventilation systems ensures they work efficiently and don't use extra energy. Checking motion sensors and controls helps catch issues early, preventing costly repairs and keeping energy use low. Scheduling routine inspections with professionals can also extend the life of equipment, saving money and maintaining peak performance. Simple steps like the above-mentioned help businesses stay energy-efficient and avoid unexpected downtime.

More Advanced Solutions: These technologies are more advanced than solutions like LED lighting, motion sensors or ventilation because they often require specialised equipment and higher upfront investments.

- **Solar Panel Installation |** Solar panel installation is becoming an **accessible and cost-effective solution for SMEs across Europe**. The International Renewable Energy Agency (IRENA) reports that the overall cost of producing solar energy, specifically for large-scale installations, has dropped 73% in the last 10 years [28], making it cheaper to install solar panels. Solar energy can be incorporated through various financing models, such as **Power Purchase Agreements (PPAs)** or **solar leasing**, which eliminate the need for large initial investments and allow payments to be spread over time. In both cases, the upfront cost will be lower.
- **Heat Recovery Systems |** Businesses in the textile industry can significantly benefit from incorporating heat recovery systems. The benefits of such systems are multifaceted. Firstly, they **lower energy consumption** by reusing waste heat, which directly translates to cost savings. Secondly, they **reduce greenhouse gas emissions**, helping businesses meet sustainability goals and comply with stricter environmental regulations. Additionally, integrating heat recovery systems can **future-proof operations against rising energy costs and regulatory pressures**, ensuring long-term operational stability and resilience. Prior to installing such systems, SMEs need to conduct an energy audit to identify waste heat sources (exhaust gases, hot water, or steam) which are often byproducts of industrial processes like textile dyeing or food processing. The upfront cost of heat recovery systems varies depending on the technology used. Options include **heat exchangers**, which transfer heat between fluids and **waste heat boilers**, which convert excess heat into steam or hot water.

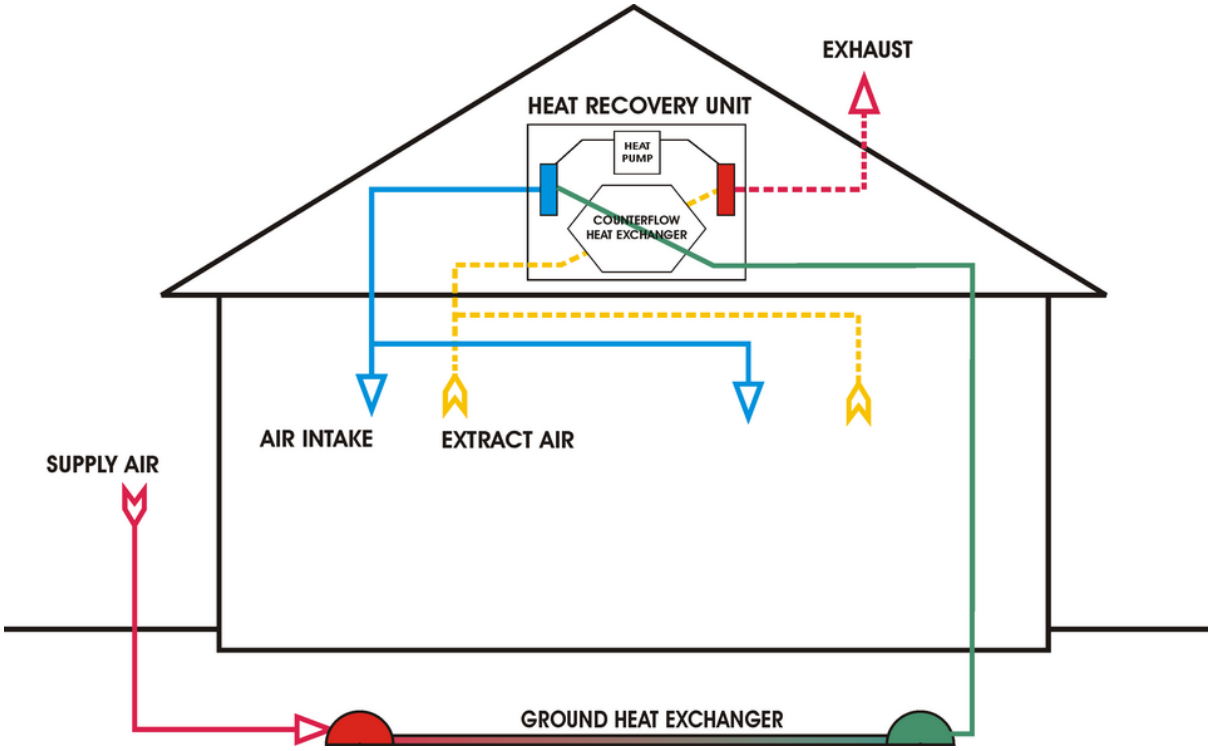

Fig. 3. Heat recovery ventilation
Source: Heat recovery - what is it and how does it work?. Pure Ventilation. (2025, May 7)

- **Biomass Energy Systems |** Biomass energy systems offer manufacturers a sustainable and cost-effective way to reduce energy costs and lower their carbon footprint. By using organic materials like wood chips, agricultural residues, or even waste, **businesses can generate heat or electricity through technologies such as biomass boilers or gasification systems**.

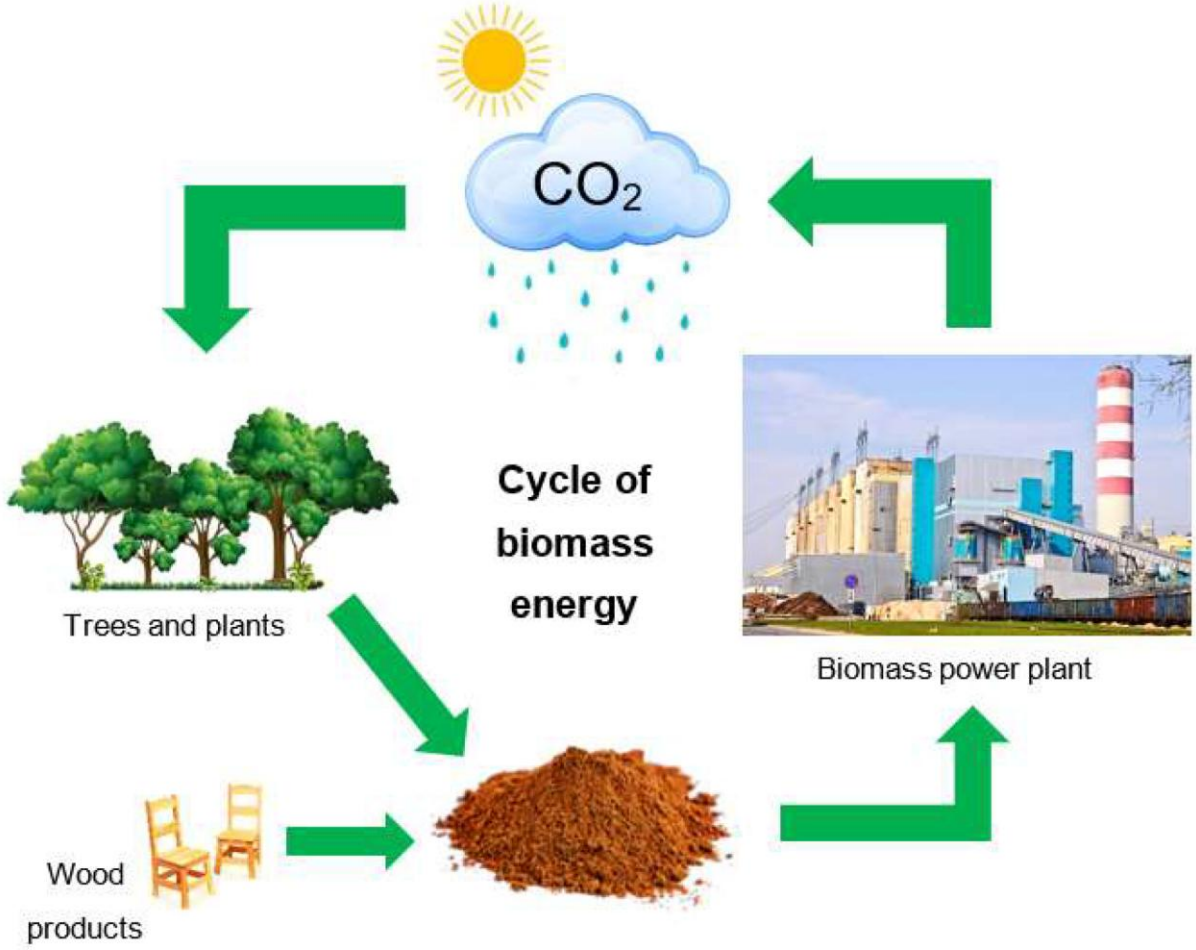

Fig 4. Cycle of biomass energy
Source: (Potential use of industrial biomass waste, Kalak, T. (2023, February 10)

- **Hybrid Power Solutions |** Hybrid power solutions combine two or more energy generation sources, typically including at least one renewable source like wind or solar, to meet electricity demands. These systems significantly reduce reliance on fossil fuels by maximising the use of renewable energy, thereby lowering greenhouse gas emissions and contributing to global emissions targets. Compared to single-source power systems, hybrid solutions offer greater benefits, such as improved **energy efficiency and greater reliability and stability in power supply**, due to the possibility of utilising multiple energy sources simultaneously.

4. Automation and Made-to-Order

Automation technologies offer manufacturers the opportunity to boost efficiency, cut costs, and sustain high-quality standards. By incorporating tools like **3D modeling, digital pattern making, and automated cutting systems**, businesses can optimise

production processes and reduce material waste. **These innovations create the foundation for more advanced manufacturing approaches**, where smart systems combine robotics, artificial intelligence, and interconnected technologies, for example, sensors, databases, and wireless networks to create adaptive, self-regulating workflows.

- **3D Modeling Implementation |** 3D modelling is the process of creating a three-dimensional digital representation of an object using specialised software. It allows businesses to visualise, design, and refine products before they are physically produced. For small businesses, **3D modelling can significantly reduce prototyping costs** by allowing the testing and modification of designs virtually without the need for physical samples. Moreover, it improves communication with clients by allowing them to view realistic renderings of the final product before production starts. In order to leverage 3D Modelling, businesses can start with **affordable or free software** like Blender [29] or SketchUp [30] and gradually **invest in more advanced tools while growing.** Training employees or hiring freelancers with 3D modelling expertise can also help integrate this technology more effectively.
- **Digital Pattern Making |** Digital pattern making is the process of creating clothing models using computer software instead of traditional manual methods. This technology is particularly beneficial for manufacturers looking to streamline their design process. By using **digital pattern-making tools** like **Optitex** [31]**, CLO** [32]**, or Gerber AccuMark** [33], it is possible to create precise, customisable patterns that can be easily adjusted for different sizes or styles. This reduces material waste and speeds up the production process, making it easier to meet customer demands. To incorporate digital pattern making, companies can invest in user-friendly software and provide training for their design teams. Digital patterns can be reused, which saves time and resources for future projects. This approach also enables the companies to compete with larger firms by offering high-quality, customised products.
- **Automated Cutting Systems** | Automated cutting systems use computer-controlled machines to cut fabrics, leather, or other materials with precision and speed. These systems are ideal for businesses in industries like apparel, upholstery, or accessories, where accuracy and efficiency are critical. By incorporating automated cutting systems, SMEs can **significantly reduce production time and minimise material waste**, **leading to cost savings**. Manufacturers can start by leasing or purchasing smaller, more affordable cutting machines like **Cricut** [34] **or Silhouette** [35] for lighter materials, or investing in industrial-grade machines like those from **Zünd** [36] for heavier fabrics. Training staff to operate these systems is essential, but once

implemented, automated cutting can enhance productivity and consistency, allowing businesses to take on larger orders.

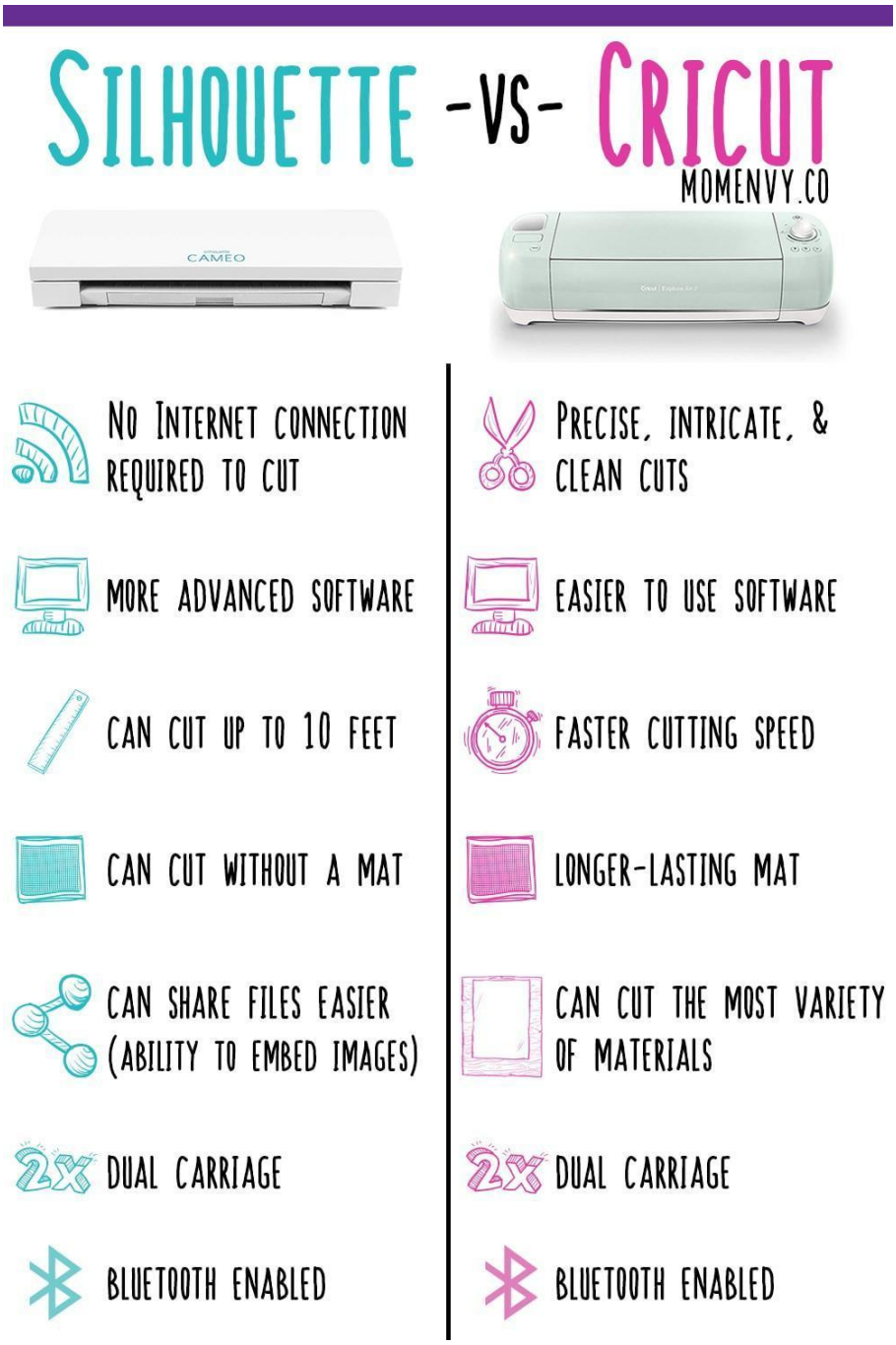

Fig. 5. Silhouette vs. Cricut – Craft Cutting Machine Comparission
Source: Silhouette vs. Cricut, Laura. (2022, January 19).

Automation technologies like 3D modelling, digital pattern making, and automated cutting systems are just a few examples of how firms can leverage technology to streamline operations and enhance productivity. Beyond these, other automating technologies like inventory management software, customer relationship management (CRM) tools can further optimise business processes. The choice of what technologies to adopt ultimately depends on the specific needs, budget, and goals of the business.

Implementing Green Technologies in Business: A Step-by-Step Guide

If you would like to make your business more sustainable, it is essential to follow these key steps:

1. Choose Sustainable Fabrics | Begin by selecting sustainable materials and understanding their specific properties. First, assess the intended purpose of the garment and identify your key sustainability priorities. Next, evaluate the performance characteristics of the fabric to ensure it meets both functional and environmental goals.

2. Source Reliable and Trusted Suppliers | Companies should collaborate with ecological suppliers who adhere to all relevant norms and standards to ensure eco-friendly and ethical production practices. Sourcing materials locally and prioritising suppliers who offer full traceability and transparency can further reduce the carbon footprint. Conducting supplier audits or collaborating with partners committed to fair labour practices helps verify ethical sourcing across the supply chain.

3. Receive certifications | Obtaining recognised eco-certifications, such as GOTS, OEKO-TEX, and Fair Trade [37], can enhance credibility and differentiate your brand in the market. Highlighting your sustainability efforts in marketing materials, product descriptions, and branding initiatives can attract environmentally conscious customers and reinforce your commitment to ethical and sustainable fashion.

4. Use Eco-friendly Dyes & Printing Methods | Traditional dyeing methods can be harmful to the environment, so opting for sustainable alternatives is vital. Plant-based or low-impact dyes require fewer chemicals and produce less water pollution. Natural dyeing techniques, using materials like turmeric, indigo, or avocado pits, offer an eco-friendly solution while creating unique textile finishes. Additionally, digital printing and screen printing with water-based inks reduce chemical waste and lower water consumption compared to conventional dyeing methods.

5. Optimise Energy & Water Use | Reducing energy and water consumption in production can significantly lower environmental impact and operational costs. Investing in energy-efficient machinery and LED lighting is a step forward to minimiing electricity use. For water-intensive processes, such as dyeing, adopting sustainable solutions like rainwater collection and water recycling systems can not only conserve

valuable resources but also maintain high-quality textile production standards. Consulting with experts can help to identify the most effective technologies and strategies tailored to your business needs.

6. Reduce Waste in Production | Minimising waste is essential for a sustainable textile business. Any leftover fabric scraps can be repurposed into smaller products like accessories, patchwork designs, or even packaging materials. To prevent overproduction, a business should consider a made-to-order circular business model, which helps control inventory and reduces surplus stock that could otherwise go to waste.

7. Implement Sustainable Packaging | Sustainable packaging reduces waste and meets the expectations of eco-conscious consumers, with 53% of them willing to pay extra for environmentally friendly options [38]. Replacing plastic packaging with biodegradable, recyclable, or reusable alternatives like kraft paper, compostable mailers, or fabric bags minimiies environmental impact and appeals to buyers.

8. Educate Customers on Sustainability | Educating consumers about sustainability is not only essential for building brand trust but also for fostering a more environmentally responsible society. Brands should be transparent about their sustainability efforts. Clear communication about eco-friendly practices, certifications (e.g., Fair Trade, organic), and supply chain transparency builds trust and shapes the brand`s image as a responsible one.

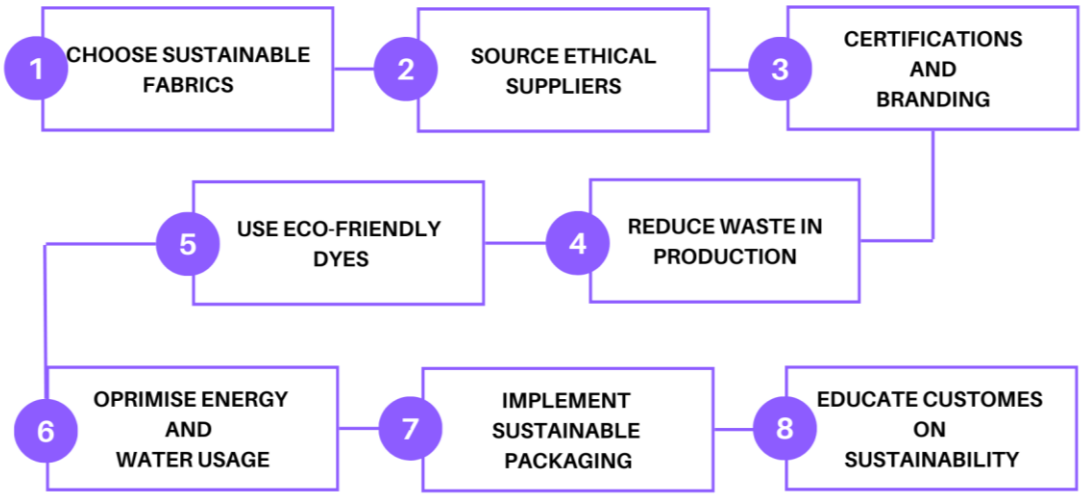

Fig. 6. Implementing Green Technologies in Business: A Step-by-Step Guide
Source: created by the authors

Key Benefits Of Adopting Sustainable Practices And Green Technologies For Textile Businesses:

Adopting sustainable practices and green technologies in the textile industry is no longer just an environmental imperative - it is a strategic business decision. While external factors often encourage companies to go green, many choose to do so voluntarily to unlock significant benefits:

Cost Reduction | Investing in initially more expensive sustainable methods can lead to noticeably lower operational costs and higher profits over time.

- Energy-efficient technologies, such as LED lighting and modern machinery, can **cut energy costs and consumption by up to 65%** for small businesses [39].
- Recycling programs and waste reduction efforts can **cut waste disposal expenses by up to 30%** [40]**.**
- Zero-water washing systems and waterless dyeing technologies eliminate water usage, and companies that adopt water recycling technologies can **save 30–40% on their water bills** [41].

Regulatory Compliance | Incorporating green practices into business operations can significantly mitigate legal risks. A study analysing S&P 500 firms from 2001 to 2022 found that green innovation reduces firm volatility by 15% and credit risk by 20% while increasing firm value by 10% [42].

Tax Advantages | Being an eco-conscious business can lead to potential tax advantages in Europe. Environmental tax incentives, such as **tax breaks, exemptions, and capital allowances**, are government programs that encourage businesses to adopt sustainable practices and reduce their environmental impact. Therefore, every business needs to check whether their country has specific green tax incentives or similar relevant programmes.

Marketing and Customer Loyalty Benefits | Sustainable practices in textile businesses boost marketing and customer loyalty, as **66% of consumers prefer eco-friendly brands** and 73% are willing to pay more for sustainable textiles. [43] This alignment with consumer values creates a positive brand image, fostering deeper emotional connections with customers.

Increased Attention from Investors | Sustainable businesses can not only benefit from some local or global government programmes but also get **increased attention from investors** [44], who are taking sustainability performance into account when making investment decisions. Given the industry's readiness for innovation, the commitments of the brands and retailers, and the size of the industry, it is not

surprising that a number of venture capital funds have been established with a primary or partial focus on this theme.

Summary

Businesses must recognise that **integrating sustainability into their core strategy is no longer optional - it is a critical driver of success**. As global warming escalates and consumer priorities shift toward eco-conscious values, adopting sustainable practices has transitioned from a passing trend to an urgent imperative. Companies that fail to align with this reality risk falling behind in a rapidly evolving market.

Consumers are also engaging with sustainable businesses in ways that they previously ignored. According to The Economist Intelligence Unit, **global Google searches for sustainable goods have surged by 71% since 2016**, **with interest growing even more since the COVID-19 pandemic hit.** This trend isn't just in first-world countries. Consumer satisfaction in developing and emerging economies is also tied to concerns around climate change, and many want businesses to commit to protecting nature and natural systems.

Beyond supporting the environment and boosting competitiveness, the shift to sustainability also brings **practical benefits, such as cost savings and improved efficiency**, setting companies up for **long-term growth and a competitive edge in an eco-conscious market**. For instance, adopting water recycling technologies can save up to 30-40% on water bills. Energy-efficient solutions like LED lighting cut energy costs and usage by up to 65%, while installing solar panels, now 82% more affordable since 2010. Additionally, automation technologies like 3D modelling, digital pattern making, and automated cutting systems lower prototyping costs by reducing the need for multiple physical samples, saving time and resources.

To fully unlock these benefits and future-proof operations, businesses should focus on key steps: use certified eco-friendly fabrics, work with ethical suppliers, get recognised green certifications, switch to sustainable dyes and printing, save energy and water, cut production waste, use eco-packaging, and teach customers about sustainability.

By integrating some of these green technologies, textile businesses can **position themselves for long-term growth and competitive advantage in an increasingly eco-conscious market**. The trend toward sustainability-driven strategies will only keep growing as global warming gets worse, making business sustainability a total must for fast and successful growth.

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