AN ACADEMIC POLICY& BUSINESS ORIENTED REPORT

Are Ecolabels Meaningful and Reliable?

A Critical Review of UK Textile and Fashion Certification

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Executive Summary

The textile and fashion industry (TFI) has a profound and multidimensional impact on the environment, contributing to climate change, biodiversity loss, water stress, and chemical pollution. Amongst increasing regulatory and societal pressure to align economic activities with environmental goals, ecolabels have become prominent tools for communicating sustainability credentials. But how effective are these labels in reflecting the real pressures linked to the industry's global value chains?

In this report we critically examine the **meaningfulness and reliability of ecolabels used by leading UK TFI firms**, assessing whether their metrics, scope, and verification methods provide a credible basis for environmental improvement. We draw on prior research that maps ecolabels to environmental policy and recurring sustainability claims, we assess the alignment between ecolabel criteria and scientifically documented environmental impacts.

Our findings reveal that while ecolabels are widespread, **they only partially reflect key environmental pressures**. Widely used labels tend to prioritise procedural standards and fibre type over measurable environmental outcomes. High-integrity schemes like GOTS remain limited in uptake, while more common certifications (e.g., BCI) often rely on mass-balance systems and lack rigorous, outcome-based metrics.

This misalignment **undermines ecolabels' potential to drive meaningful change**. Most schemes focus narrowly on production pressures, with little connection to systemic environmental states or impacts. They are rarely integrated with science-based frameworks or corporate sustainability standards, limiting their role as credible tools of environmental governance.

To address these gaps, this report recommends that policymakers and industry stakeholders:

- **Align ecolabels with science-based metrics** reflecting real-world environmental pressures;
- **Enhance traceability and verification**, especially in systems using blended or mass-balance models;
- **Communicate outcomes more effectively**, helping consumers and stakeholders understand the real-world impact of certified choices; and
- **Support high-integrity ecolabels** through procurement, fiscal incentives, and trade policies, with a shift towards metrics that promote systemic impact prevention, not just recycling.

Without such changes, ecolabels risk spreading *green-ish practices* such as greenwashing, greenwishing, greenlighting and greenhushing, rather than meaningfully contributing to the environmental sustainability of the textile and fashion industry.

Glossary

Ecolabels	Voluntary self-regulation tools that indicate products (or processes) as environmentally preferable based on life-cycle considerations. Ecolabels signify that the product meets stated environmental and social criteria, thereby claiming it has less negative environmental (and/or social) impacts compared to similar products. Ecolabels with independently verified, credible, non-misleading information about the environmental impacts of products, differentiates products in the marketplace with an aim to promote more sustainable production and consumption practices.
Eco-credentials	Standards that help firms enhance their environmental performance.
EU Policy	An EU policy is a set of principles, rules, and guidelines that shape and direct the actions of the EU and its member states in various areas of public concern. It establishes a framework for consistent decision-making and implementation across the EU.
Fast-fashion	Low-cost textile apparel frequently updated in large retail chains
Fibre	Neutral category that includes both virgin and recycled materials.
Greenhouse gases – GHG	Gases that trap heat in the Earth's atmosphere, contributing to global warming and climate change. Key GHGs include carbon dioxide, methane, nitrous oxide, and fluorinated gases, all measured in terms of their global warming potential.
Greenwashing	The misleading practice of promoting products, services, or firms as environmentally friendly when they are not, or to a lesser extent than claimed.
Greenwishing	Setting overly ambitious sustainability targets or actions without realistic means to achieve them. Often unintentional and described as "sustainable intention without a strategy," it typically arises from pressure to demonstrate environmental commitment despite limited financial, technological, or organisational capacity. It also refers to individual behaviours, such as placing items in the recycling bin with hope rather than certainty that they will actually be recycled.
Greenhushing	The deliberate practice of withholding or minimising public communication about sustainability efforts or progress. Often driven by concerns over reputational risk, scrutiny, or accusations of greenwashing, it leads to limited or no public disclosure regardless of genuine action.
Greenlighting	The practice of selectively highlighting positive environmental attributes while omitting key limitations or trade-offs. For example, a label may promote "Better Cotton" without disclosing that it is based on a mass-balance system, meaning the certified material cannot be traced to individual garments.
Raw fibre	The physical form of a material immediately after harvest or collection, prior to any processing. Generally understood to be virgin, though the term itself does not explicitly denote origin.
Value chain	The integration of all activities and processes through which a product gains value involved in the creation and distribution of a product, from design and production to marketing, distribution, and after-sales services.
Value chain tier/sub-tier	The different levels or stages in the production process, from raw material extraction to the final product reaching the consumer. Within each tier of the textile fashion value chain, there are sub-tiers that represent more specific processes and activities. For example, Tier 2: Yarn and Fabric Manufacturers, Sub-tiers: Spinning, Weaving/Knitting, and Dyeing and Finishing
Virgin fibre	A fibre that has never been previously used or recycled.
Supply chain	The network of organisations, activities, resources, and technologies involved in the sourcing, production, and distribution of goods or services from raw materials to the final consumer.

Table of Contents

1. Introduction

1.1. The environmental impact of the textile and fashion industry

The global textile fashion industry (TFI) has emerged as a critical sector in policy discussions on environmental sustainability (European Commission, 2022a; House of Commons, 2019; UNCC, 2018; UNEP and Petrie, 2023). Its scale and complexity mean that its activities now exert a measurable influence on key planetary systems (Cornell et al., 2021; Niinimäki et al., 2020; Sandin et al., 2019). From driving greenhouse gas emissions and depleting natural resources to contributing to water pollution and the spread of synthetic microfibres, the industry's environmental footprint is substantial and multidimensional.

1.2. Ecolabels as tools for environmental improvement

As policymakers and businesses work to align economic activity with climate and biodiversity goals, the credibility of sustainability claims, especially those communicated through ecolabels, has become both a strategic and environmental imperative. Given this environmental complexity and the growing urgency to mitigate impacts, tools that credibly signal sustainability have become increasingly important. Among these, ecolabels stand out as prominent instruments designed to guide both industry practices and consumer choices (Boström and Klintman, 2008; Darnall and Aragón-Correa, 2014).

Ecolabels are voluntary, market-based tools designed to indicate that a product has a comparatively lower environmental and/or social impact. By differentiating products based on sustainability claims, they aim to shape both industry practices and consumer behaviour (Boström and Klintman, 2008; Darnall and Aragón-Correa, 2014; Kesidou and Palm, 2024). Within the TFI – which increasingly faces scrutiny for its greenhouse gas emissions chemical pollution, and biodiversity impacts – ecolabels have emerged as key instruments for communicating environmental performance and encouraging alignment with sustainability goals (Kesidou and Palm, 2024).

However, ecolabels do not operate in isolation. They evolve in response to shifting regulations, market dynamics, and consumer expectations. Their standards both influence and are influenced by emerging regulations, commonly repeated environmental metrics, and the shifting priorities of key stakeholders such as governments, NGOs, and consumers. As such, ecolabels serve as indicators of environmental performance, relying (directly or indirectly) on specific metrics to assess or compare impacts such as water usage, carbon footprint, and use of harmful chemical. For these certifications to be effective, they must provide **meaningful** information – i.e., information that is actionable, transparent, and relevant to stakeholders including consumers, policymakers, and businesses. Equally important is the **reliability** of ecolabels, which requires scientifically valid, consistent, and verifiable metrics.

The aim of this report is to assess whether ecolabels used in the UK TFI **meaningfully** reflect actual environmental pressures and to explore how their **reliability** can be strengthened, to better support informed decision-making by businesses, policymakers, and consumers.

Previous studies provide a foundation for this analysis. Kesidou and Palm (2024) have identified ecolabels currently used or that could be used within the UK TFI and mapped their links to legislation concerning climate change and textile waste. In parallel, Purnell and colleagues (n.d.) have analysed recurring quantitative statements relating to the industry's resource use and environmental impact. Building on these findings by comparing the ecolabel credentials documented by Kesidou and Palm (2024) with the sustainability metrics analysed by Purnell et al. (n.d.), we identify discrepancies between ecolabel criteria and actual environmental performance.

This report is written as an *academic, business- and policy-oriented document*, combining scholarly rigour with relevance for industry and policy stakeholders. To enhance accessibility a focused, argument-driven narrative, the main text presents the analysis in clear, policy-relevant terms. The report's theoretical and conceptual underpinnings – essential for academic credibility and methodological transparency – is provided in **Appendix A**. This structure ensures that while the main findings remain accessible to non-academic audiences, the report retains complete academic traceability and conceptual integrity.

1.3. Research questions and objectives

In this report we seek to answer the following research question:

> *To what extent do ecolabels used by leading UK TFI firms – through their choice of metrics, scope, and verification modes –* ***reliably*** *and* ***meaningfully*** *reflect the industry's documented environmental pressures? What does this imply for their effectiveness in supporting credible environmental improvement?*

We focus on top UK firms and the most applied ecolabels within the sector. Our objectives are to:

- Critically evaluate the **meaningfulness** and **reliability** of ecolabel metrics;
- Assess their **alignment** with documented environmental pressures;
- Explore how ecolabel **design** and **verification** practices intersect with evolving policy instruments; and
- Derive **clear** policy and business recommendations to enhance ecolabel effectiveness.

1.4. Scope and delimitations

This report focuses on ecolabels used by leading UK TFI firms, and the primary emphasis is on the UK market and policy landscape. Although it does not provide a comprehensive international comparison, references are made to EU and global contexts where relevant. The analysis concentrates specifically on environmental sustainability metrics, such as greenhouse gas emissions, water use, chemical inputs, and biodiversity impacts, and does not extend to social or labour standards embedded in ecolabels. The study is based on publicly available data sources, including academic publications, grey literature, and relevant policy documents, rather than empirical data or stakeholder interviews. As such, it offers a critical desk-based assessment of how ecolabels align with documented environmental pressures and evolving regulatory frameworks.

2. Literature review

2.1. Environmental pressures from the TFI

There is broad consensus across academic, industry, and policy literature that the global TFI exerts substantial and unsustainable pressure on environmental systems (EMF, 2017;

European Commission, 2022b; European Parliament, 2024; Niinimäki et al., 2020; Purnell, 2019; UNEP and Petrie, 2023). These pressures include significant contributions to greenhouse gas emissions, freshwater depletion, chemical pollution, and biodiversity loss. Most importantly, these are intertwined processes that collectively regulate the stability of the Earth system (Cornell, 2012; Rockström et al., 2009). As such, they call for coordinated, systemic strategies to avoid trade-offs, where progress in one area may unintentionally undermine efforts in another.

TFI activities contribute to intensifying these pressures, but the complexity and opacity of the industry's global value chains hinder the development of consistent and comprehensive environmental metrics. Empirical studies report substantial variation in estimates of carbon emissions, water use, and chemical inputs across fibre types, production processes, and value chain configurations (Dahllöf, 2003; FAO, 2015; Purnell et al., n.d.; Sandin et al., 2019).

Sandin and colleagues (2019) highlight a notable lack of reliable environmental data across different fibre types, and caution against generalisations that overlook supplier-specific practices. They argue that "*there are no 'sustainable' or 'unsustainable' fibre types – it is the suppliers that differ*", noting that variability within each fibre type often exceeds that between types. This undermines the credibility of claims based solely on material choice.

Similarly, Purnell et al, (n.d.)observe that many widely cited environmental statistics in the TFI are based on untraceable or inconsistent sources. They argue that "*the environmental benefits of recycling are overstated, particularly in the face of relentless industry growth*" and caution that fibre switching – whether to 'greener' virgin fibres or recycled content – will likely produce marginal and uncertain systemic effects unless accompanied by broader structural changes.

This caution is echoed in analyses of the environmental gains of fibre-to-fibre recycling. Studies (Quantis, 2018a; Ribul et al., 2021; WRAP, n.a) estimate that even a full transition to 100% recycled fibres would yield only a 15–30% reduction in carbon emissions – savings that are technically difficult to realise and could be offset within five years by current market growth rates of 4–7% annually (Quantis, 2018b; Textile Exchange, 2024). Moreover, such gains are vulnerable to rebound effects, whereby increased use of low-cost recycled fibres that are marketed as "green" alternatives might increase overall consumption (see e.g. Zink and Geyer, 2017). This suggests that the sector's current emphasis on fibre substitution and recycling may distract from the more pressing need for systemic interventions that address production volumes, business models, and consumption patterns.

Together, these findings suggest that the environmental impacts of the TFI cannot be adequately addressed through narrow interventions such as fibre substitution, content labelling, or recycling in isolation. Instead, systemic, data-driven, and context-sensitive approaches are required to guide meaningful reductions in environmental pressures and to align industry practices with the science-based limits of Earth system stability.

Table 1 provides an overview of the global TFI's key environmental pressures, organised in relation to the Earth system processes they affect, and the types of actions typically proposed to mitigate these impacts in accordance with multilateral policy agreements and the Sustainable Development Goals (SDGs). It also serves as a reference point for evaluating the extent to which current ecolabels reflect and respond to these pressures in a scientifically reliable manner that is meaningful to stakeholders.

Table 1. TFI environmental pressures on Earth system. (Adopted and revised from Cornell et al., 2021 detailed references found in Appendix X).

CLIMATE CHANGE	BIODIVERSITY LOSS	LAND USE CHANGE	FRESHWATER USE	NUTRIENT FLOWS	CHEMICAL POLLUTION
The fashion industry ranks as a prominent industrial CO_2 emitter of the maximum carbon emissions targeted in the 2015 Paris Agreement, aimed at limiting global warming to 2°C above pre-industrial levels.	Monoculture farming, deforestation, and the introduction of non-native species contribute to soil degradation and biodiversity loss. Fibre production processes – such as chemical treatments, dyeing, and wastewater discharge – further exacerbate biodiversity loss through air, soil, and water pollution.	Widespread irrigation creates soil salinization creating landscapes where small-scale agriculture is no longer viable. This leads to the abandonment of land, thereby contributing to land-use changes.	Water is used in all production. Cotton crops are sensitive to water availability. Intense irrigation leads to salinization and movement of crop areas, putting added pressure on freshwater use.	The chemically intensive cotton agriculture causes eutrophication and rising emissions of nitrous oxide, which is both a greenhouse gas and an ozone depleter.	Fibres and textiles production use harmful substances polluting through runoff and waste.
ACTION TARGETS					
Immediately reduce year-on-year in CO_2 emissions by a minimum of 8% per year to achieve carbon neutrality by 2050. • Reduce as fast as possible to enhance the probability of climate stabilization at lower global temperatures and decrease the risks of severe impacts on societies and nature.	Aim for no further net loss of biological diversity and strive for net gains each year in the coming decade. • Ensure that No Net Loss assessments consider the need for ecosystems to be resilient to committed climate changes. • Offset unavoidable ecosystem with equivalent protections to habitats, species populations, and the genetic 'library of life'. • Reforestation is crucial for biodiversity and climate benefits.	Triple the fraction of crop production that avoids land degradation and contributes to climate change mitigation by 2030, using approaches like agroecology and sustainable intensification. • Halt deforestation and other land degradation linked to fibre and feedstock production. • Increase material production derived from regenerative and 'climate-smart' agriculture.	Reduce freshwater abstraction and consumptive use by at least 30% by 2030. • Mitigate direct water security risks to brands and acknowledge the collective nature of water as a shared resource. • Address local needs, aligning with SDG Targets 6.2-6.6, understanding the comprehensive nature of the water cycle beyond tap water and pipes.	Adhere to local air and water quality targets and policy requirements throughout the fashion industry's value chain and operational areas. A comprehensive global scientific assessment setting an overarching global goal is currently lacking. Brands have the opportunity to take immediate action despite the absence of a global assessment.	Science supports a *systemic* target-setting process, reliant on establishing transparency and accountability throughout the entire value chain. • Halt environmental release of chemicals of high concern along the entire value chain. • Reduce the use of harmful pesticides by 50%. • Prevent waste generation by rapidly escalating efforts in redesign, reuse, and recycling.

2.1.1. The importance of appropriate environmental metrics

To assess whether ecolabels meaningfully reflect actual environmental pressures, we begin by identifying such pressures across TFI value chain activities (see Table 2). As shown, fibre production is a key stage associated with multiple pressures, including GHG emissions, land-use change, and water and chemical use.

To inform strategies, environmental pressures must be tracked with appropriate metrics. Climate change is typically assessed through physical indicators such as CO_2 emissions, greenhouse gas (GHG) concentrations, and changes in global average temperature (IPCC, 2022). These metrics provide a coherent direction of change, though year-to-year variation is expected. Biodiversity loss, in contrast, requires a suite of ecological metrics. Mace et al. (2014) argue that a combination of species-level, habitat-level, and planetary-scale indicators is necessary to reflect the multidimensional policy targets set out in the Convention on Biological Diversity (Biosafety Unit, 2025). Water use, pollution, including nutrient disruption, and land use change are not only drivers of both climate and biodiversity impacts, but also generate direct environmental consequences across scales (Rockström et al., 2009; Steffen et al., 2015).

In the TFI, environmental pressures arise across multiple stages of a garment's life cycle, from raw material extraction to end-of-life. These stages are often conceptualised using value chain frameworks, which group activities into standardised phases such as *cradle-to-gate*, *gate-to-grave*, and others. While these value chain scopes are defined in more detail in Section 2.2, Table 2 below provides an overview of the primary environmental pressures associated with each main value chain stage. This mapping helps establish a foundation for assessing how effectively ecolabels reflect these pressures in later sections.

Table 2. Environmental pressures from TFI value chain activities.

Note: The environmental pressures listed in this table are based on syntheses from key publications including (Cornell et al., 2021; IPCC, 2022; Sandin et al., 2019), alongside other scientific reviews and industry reports.

VALUE CHAIN STAGE	PRIMARY ENVIRONMENTAL PRESSURES
Raw material extraction	- Greenhouse gas emissions (GHGs) from fertilisers, soil disturbance, and land-use change (for agricultural fibres) and petrochemical extraction and processing (for polymer fibres). - Freshwater use for e.g. cotton cultivation and polymer processing - Land use change due to deforestation or land conversion for farming - Use of nitrogen (N) and phosphorus (P) fertilisers in natural-fibre agriculture - Chemical use (pesticides, herbicides and fertilisers for agricultural fibres, precursors and catalysts for polymer fibres)
Yarn & Fabric production	- Greenhouse gas emissions from energy-intensive production - Freshwater use in washing and processing - Chemical use (dyes, bleaches, processing chemicals, and finishing agents) - Release of fragmented fibres (microfibers) from fibre and yarn production - Atmospheric aerosol loading from industrial emissions
Cut & Sew	- Greenhouse gas emissions from energy use in factories - Chemical use (fabric treatments, adhesives, coatings) - Wastes to landfill and incineration
Distribution & Retail	- Greenhouse gas emissions from transportation and logistics - Wastes to landfill and incineration
Consumer use	- Freshwater use in washing - Chemical use (detergents, fabric softeners) - Greenhouse gas emissions from energy used for transports and laundering
End-of-Life management	- Greenhouse gas emissions from export, landfill decomposition or incineration - Energy use in mechanical and chemical recycling processes - Chemical leaching from textile waste - Release of fragmented fibres (microfibers) from textile waste - Atmospheric aerosol loading from uncontrolled waste burning - Chemical use in textile reprocessing (e.g., solvents in chemical recycling) - Excessive freshwater use in fibre reclamation processes

Overall, the combined share of recycled fibres declined from 7.9% in 2022 to 7.7% in 2023, primarily due to increased production of lower-cost, fossil-based polyester (Textile Exchange, 2024). The pressures seen in Table 2 are further intensified by the structural composition of the global fibre market.

According to the Textile Exchange Market Report (2024), the market continues to be dominated by virgin fossil-based synthetics. Polyester alone accounts for approximately 57% of global fibre production, of which only 12.5% is recycled polyester – equivalent to just over 7% of total global fibre production, a decrease from 13.6% the previous year. Note that in 2023, 98% of recycled polyester came from PET bottles, not from fibre-to-fibre recycling (Textile Exchange, 2024, p. 11). Other recycled fibres similarly represent a marginal share: recycled polyamide comprises only 2% of the total polyamide market and recycled manmade cellulosic fibres just 0.7% of their category.

The certification landscape for organic cotton at the farm level is highly fragmented, involving a wide range of standards that vary in geographic scope, governance, and mutual recognition. While some standards are national and others are international, and some are public while others are private, this diversity creates significant complexity. Importantly, global aggregation of organic cotton volumes is particularly challenging due to frequent multiple certifications of the same production and the fact that not all standard-setting bodies publish data. This lack of standardisation and transparency makes it difficult to generate reliable global statistics on organic cotton production. Organic certified cotton is estimated at 2.3% of global cotton production, meaning 0.46% of global fibre production. *Better Cotton* certified fibres comprising around 8% of global cotton production, e.g. 1.6% of global fibre production (Textile Exchange, 2024). Overall, global cotton production accounts for 20% of total textile fibre production, while wool accounts for approximately 0.9% (Textile Exchange, 2024).

Figure 1 below visualises the 2023 market share of key fibre types, distinguishing between their conventional and recycled forms. It shows the persistent dominance of virgin/conventional fibres and the limited share of recycled fibres. The distribution highlights the TFI's rooted reliance on virgin synthetic fibres and the limited uptake of circular alternatives, despite growing sustainability discourse. The data underscore a critical structural barrier to reducing environmental pressures through fibre choice alone.

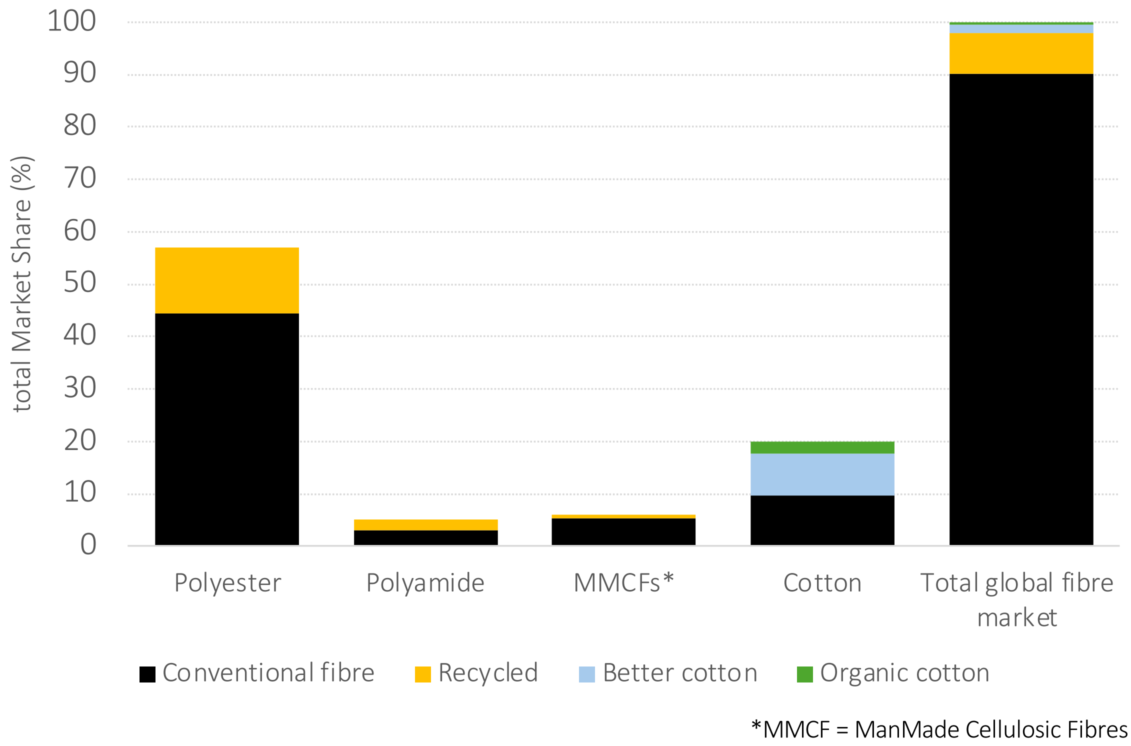

Figure 1. **Global Fibre Market Composition and Recycled Shares.**

(Figure by authors; source: Textile Exchange, 2024)

2.2. Value chain and environmental responsibility

TFI firms often define the boundaries of their activities using the concept of the value chain which usually begins with the extraction and production of raw materials and ends with the point of sale or disposal. The scope of a value chain refers to which stages and tiers are included in relation to a product's lifecycle (Figure 2). This includes upstream tiers (from raw material extraction to cut-and-sew) and downstream tiers (from consumer use to end-of-life, which may or may not include reuse and/or recycling).

From a sustainability perspective, firms are increasingly expected to set boundaries that go beyond their owned or directly controlled operations. This involves identifying and accounting for both direct and indirect impacts across the full value chain. As emphasised in corporate emissions accounting standards – such as the GHG Protocol (World Resources Institute, 2015) – comprehensive boundary-setting helps firms to better understand and manage environmental risks and opportunities across all tiers of activity. Below, we outline five common value chain scopes relevant to the TFI, visualised in Figure 2 and based on descriptions by Kesidou and Palm (2024).

- **Cradle-to-Cradle** – A business strategy that aims to mimic the regenerative cycle of nature in which waste is reused. Products are created in a way that at the end of their life cycle, they can be completely recycled or biodegraded, creating a closed-loop system.
- **Cradle-to-Grave** – Refers to the entire life cycle of a product, from the extraction of raw materials (cradle) to the end of the product's life (grave). This scope includes all stages such as raw material extraction, manufacturing, distribution, use, and disposal or recycling.
- **Cradle-to-Gate** – Covers the life cycle stages from the extraction of raw materials (cradle) up to the point where the product leaves the cut & sew (gate). This scope includes raw material extraction, transportation, and manufacturing processes.
- **Gate-to-Grave** – Covers the life cycle stages from when the product leaves the cut & sew (gate) to its disposal or end-of-life (grave). This scope includes distribution, use, and disposal phases.
- **Gate-to-Gate**: Refers to the environmental impact of processes that occur between two specific points within the production phase. This scope focuses typically on the impacts from one process to another within the manufacturing stage.

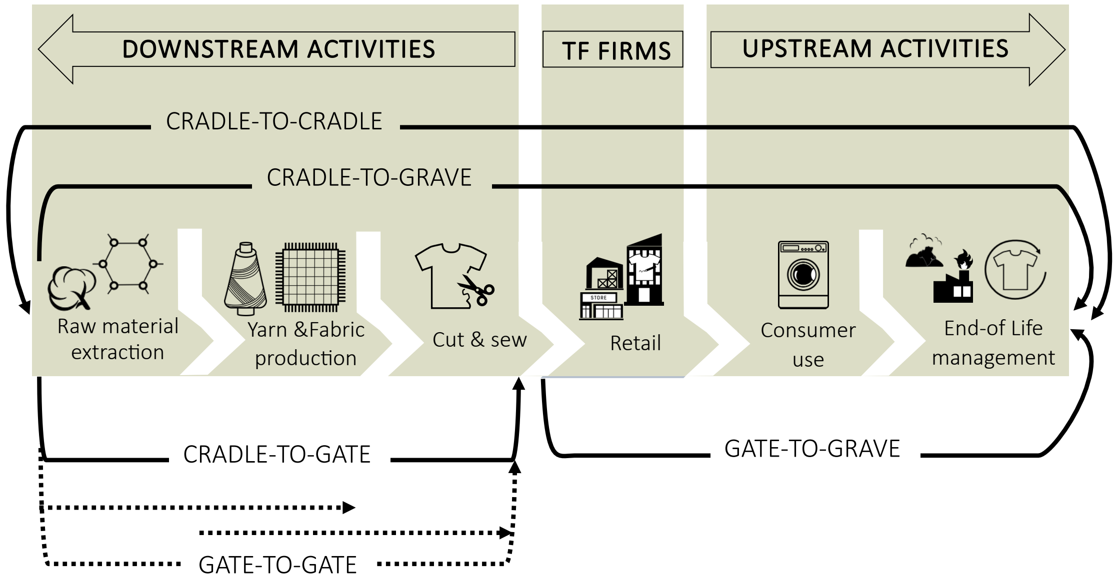

Figure 2. Value chain scopes, alongside tiers downstream and upstream.

2.3. Ecolabel types, scope, verification

Ecolabels are voluntary standards designed to inform stakeholders about the sustainability characteristics of a product or service, which generally include social and economic as well as environmental dimensions. Within the TFI, ecolabels function as both market-based instruments and tools for environmental governance, conveying information about environmental practices across different stages of the value chain. To critically assess the reliability and meaningfulness of ecolabels used by UK TFI firms, it is necessary to understand their classification, scope, and verification mechanisms.

2.3.1. Ecolabel types and verification

Ecolabels in the TFI differ not only in the environmental aspects they address but also in how their claims are verified, which is a key factor in determining their credibility and trustworthiness. Broadly, three modes of verification can be distinguished (Kesidou and Palm, 2024), each with different implications for robustness and stakeholder confidence:

- **Third-party verification**: Conducted by independent bodies with no vested interest in the producer or product, this mode is widely regarded as the most credible. It generally includes structured methodologies, document reviews, and in some cases on-site audits or chain-of-custody assessments. Third-party verification enhances accountability and stakeholder trust, particularly when certifying bodies are transparent about their criteria and assessment procedures.
- **Second-party verification**: This involves review by entities with a direct interest in the product or producer, such as trade associations, suppliers, or buyers. Although it introduces some external evaluation, the process remains susceptible to bias and conflicts of interest, limiting the impartiality and credibility of the claims.
- **First-party claims (self-declared)**: These are made by companies about their own products or practices, without any form of external review. While they may serve a marketing purpose, they lack formal oversight and are often not substantiated by detailed or transparent methodologies. As such, they are typically considered the least reliable form of environmental labelling.

2.3.2. Scope of ecolabels in the TFI

Ecolabels differ significantly in terms of which parts of the value chain they cover. Some address the full product life cycle (e.g., **cradle-to-cradle**), while others focus on specific stages such as raw material extraction or manufacturing (e.g., **cradle-to-gate** or **gate-to-gate**). The scope of an ecolabel determines the range of environmental pressures it accounts for and the degree to which it aligns with the known environmental hotspots in the TFI value chain (see Section 2.1).

This variation in scope is critical to the current analysis. Labels that limit their scope to upstream processes, for example, may omit significant downstream impacts such as consumer use or end-of-life waste, which are relevant to environmental outcomes. Conversely, broader-scope labels may offer a more comprehensive picture but also face greater methodological challenges in maintaining consistency and traceability across complex global value chains.

2.4. Ecolabels in business and policy context

Ecolabels have emerged as a prominent tool in sustainability governance, aiming to communicate environmental performance and incentivise improved practices. However, the role of ecolabels in the TFI remains contested. Existing literature raises concerns that many labels, while widely adopted, fail to adequately capture the complexity of environmental impacts across the value chain. Studies have identified common shortcomings such as limited metric scope, insufficient transparency, and varying degrees of scientific rigour (Darnall and Aragón-Correa, 2014; Kesidou and Palm, 2024; Plakantonaki et al., 2023; Ranasinghe and Jayasooriya, 2021). In parallel, regulatory developments are increasingly requiring that environmental claims be accurate, verifiable, and grounded in standardised indicators. This dual dynamic of growing consumer and policy pressure, alongside lingering doubts about credibility, has positioned ecolabels at the intersection of business strategy, market regulation, and environmental governance. This section explores the strategic and regulatory contexts shaping the role and function of ecolabels in the TFI, focusing on both business motivations and evolving compliance landscapes in the UK and EU.

2.4.1. Business strategy and consumer trust

Sustainability initiatives are increasingly embedded within branding strategies, as firms integrate environmental and social considerations into their brand identity to meet stakeholder expectations and maintain competitive advantage. Although companies differ in their degree of commitment to sustainability, their actions are invariably influenced by branding imperatives and the necessity to comply with evolving regulatory frameworks (Foroudi et al., 2021; Loučanová et al., 2021).

A relevant indicator of industry priorities is *The State of Fashion*, an annual strategic report produced by McKinsey & Company, a global management consultancy (McKinsey & Company, 2025, 2023; McKinsey & Company and Business of fashion, 2024, 2022). This publication provides data-driven insights into trends, challenges, and opportunities within the global fashion industry, and is intended to inform strategic decision-making. As such, it offers a useful reflection of the industry's prevailing concerns and risk perceptions.

Notably, sustainability and environmental concerns do not feature among the top five business risks identified for 2025. The report lists "*Consumer confidence and appetite to spend*" as the foremost business risk (McKinsey & Company, 2025, p. 9). Nonetheless, the report also frames sustainability not purely as an ethical imperative, but as a lever for strategic risk mitigation and operational cost-efficiency. It encourages brands to take proactive action on sustainability to remain competitive, comply with increasing regulatory demands, and adapt to future resource constraints.

This framing emphasizes the positioning of sustainability as a business strategy rather than an environmental ideal, reinforcing the notion that brands must engage not only to meet policy expectations but to secure long-term resilience. In this context, as pointed out by Testa and colleagues (2015) the role of the consumer becomes increasingly important.

There is no scientific consensus on what role ecolabels play for consumers when making a purchase decision. For example, Henninger (2015) finds consumers are "*neither aware of these labels, nor do they necessarily understand their meaning*", indicating ecolabels play a minor role in decision-making processes. In contrast to this Testa et al. (2015) find that consumers increasingly rely on third-party certification as a substitute for traditional forms of brand loyalty. Furthermore, they find that *trust* in ecolabels significantly influences purchasing behaviour and can be strengthened through retailer involvement in promoting and educating consumers about ecolabels. Kesidou and Palm (2024) point to the importance of transparent third-party verification and emphasise trust as a key component for efficient ecolabels. However, without strong policy support to ensure the credibility and clarity of ecolabels, consumer demand alone is unlikely to drive substantial market transformation (Kesidou and Palm, 2025; Testa et al., 2015).

2.4.2. Regulatory frameworks shaping ecolabel use in the UK and beyond

As stated in the McKinsey & Company report (2025), policy-making including current and upcoming regulation also shapes business sustainability actions, of which ecolabels are a part. The global reach of the TFI means that it is impacted by regulations and legislations across multiple jurisdictions. The EU can be said to have in many ways taken the lead role in attempting to regulate this complex industry. The EU Strategy for Sustainable and Circular Textiles (European Commission, 2022b) aims in short to lessen environmental pressures from the textile industry by stressing the importance of decoupling textile waste generation from the industry's growth. Following this, a strand of new and updated regulations is being enforced to which all TFI firms must comply if they intend to enter the EU market. This means that UK TFI is directly impacted by these EU regulations. In addition, UK regulation is also being revised and updated with similar requirements as within the EU (GOV.UK, 2022; Kesidou and Palm, 2025).

Central to the EU's regulatory direction is the coming *Ecodesign for Sustainable Products Regulation* (ESPR) (European Commission, 2024), which is designed for circularity and resource-efficiency, mandating sustainability in materials used for garments and textiles. This includes obligations around durability, reparability, recycled content, and transparency of environmental performance. One major implication of ESPR is the planned integration of the *Digital Product Passport* (DPP) in the ESPR. DPP is intended to be a mechanism for disclosing standardised environmental data across value chains (D. G. for P. R. S. European Parliament, 2024). Ecolabels that aim to remain viable in this context must not only reflect environmental performance, but claims made must also be verifiable as well as compatible with the emerging regulatory infrastructure.

In parallel, the proposed *Green Claims Directive* (European Commission, 2020) targets the surge of vague or misleading environmental claims in product marketing. It mandates that claims about a product's environmental benefits must be substantiated using recognised scientific evidence and independently verified data. This policy is particularly relevant for ecolabel schemes, as one of their key aim is to serve as a communication tool that "*differentiates products in the marketplace with an aim to promote more sustainable production and consumption practices*" (Kesidou and Palm, 2024). The *Green Claims Directive* reinforces the demand for rigorous verification and alignment with standardised environmental indicators.

The UK, while developing its own regulatory trajectory post-Brexit, is closely mirroring EU developments in several respects. The *UK Green Claims Code*, launched by the Competition and Markets Authority (CMA, 2021), requires that firms making environmental claims are clear, accurate, and substantiated by evidence. This reflects a broader trend in which regulatory authorities in both jurisdictions are increasing scrutiny over environmental communication, positioning third-party verified ecolabels as a preferred, and often necessary, means of ensuring compliance.

Taken together, these regulatory developments are transforming ecolabels from optional marketing tools to instruments of legal and strategic significance. They are increasingly expected to reflect consistent and verifiable environmental data. For UK TFI firms, this reinforces the imperative to use ecolabels that are not only methodologically robust but also responsive to evolving regulatory landscapes. As ecolabels become more intwined with compliance, their scope, credibility, and verification mechanisms will decide their meaningfulness in a tightly regulated global market.

In summary, existing literature highlights a growing concern that many ecolabels, while popular, may inadequately represent complex environmental impacts in the TFI sector. Several studies point to limited metric scope, lack of transparency, and variable scientific rigour as key challenges. Policy debates underscore the tension between the need for accessible consumer information and the complexity of environmental assessments. In this report we build on these discussions by applying a systematic evaluation of ecolabels used specifically in the UK TFI context, addressing gaps in empirical assessment of metric meaningfulness and reliability.

3. Methodology

In an era increasingly shaped by data abundance, misinformation, and performative sustainability claims, it is imperative that academic research maintains a transparent and robust theoretical grounding. The spread of *green-ish practices* such as greenwashing, greenwishing, greenlighting and greenhushing often lacking rigorous validation, reinforces the importance of anchoring analytical work within a clearly articulated metatheoretical foundation. Here we therefore draw on established theoretical constructs not only to ensure analytical consistency and credibility, but also to support the interpretability and reproducibility of its findings.

In short, the analytical logic underpinning this work is explicitly informed by **critical realism** and **systems thinking** – further described in Appendix A. These approaches help us examining the ecolabels, including their embeddedness within broader socio-political, economic, and ecological systems. This foundation is essential to move beyond descriptive evaluation, allowing our analysis to examine how ecolabels are shaped and understood not just by what is visible – such as claims and metrics – but also by the deeper systems, practices, and rules that influence how environmental impacts are measured and communicated.

3.1. Research design and document analysis approach

We use a desk-based research design comprising:

- A systematic review of policy documents, ecolabel standards, academic literature, sustainability reports and websites, all relevant to UK TFI sustainability metrics.
- Document analysis of ecolabel criteria, focusing on metric content and verification mechanisms.
- Application of the analytical framework to categorise and critically assess ecolabel performance relative to documented environmental pressures.

To analyse the identified ecolabel standards, we gathered data on analysing specific environmental indicators measured by each ecolabel, their value chain scope, material area, and the robustness of their verification processes. Special attention was given to identifying how these ecolabels criteria define, quantify, and report on carbon emissions and waste reduction.

3.2. Data collection and sources

Building on the work of Kesidou and Palm (2024), who systematically identify 155 certifiers and ecolabels from multiple sources and ultimately analyse a refined list of 44 ecolabels, we adopt their dataset as the empirical basis for our assessment. Their selection criteria ensure that these ecolabels are:

- applicable to the textile and fashion sector;
- relevant to the UK context;
- and inclusive of at least one environmental attribute.

We assume that the ecolabels adopted by the leading UK textile and fashion firms identified in this study are included within this curated list. Moreover, their comprehensive mapping of ecolabels covering environmental dimensions, verification type, ownership structure, value chain scope, material focus, and intended audience, provides the initial data infrastructure for our analysis. Additional information on the ecolabels, including their standards and environmental claims, was sourced from publicly accessible content on official ecolabel websites. As noted by Bowen (2009), this constitutes a legitimate approach to document analysis and reflects the primary means by which consumers access ecolabel-related information.

We acknowledge that relying on publicly available online documents introduces several limitations. These sources are often produced for purposes other than academic inquiry and may lack the depth and specificity needed for robust environmental analysis. Additionally, access to key materials is frequently restricted – whether through paywalls, proprietary platforms, or intentional omission. Even when documents are accessible, they often reflect organisational priorities, leading to a selective and potentially skewed portrayal of sustainability claims. As Yin (2009) notes, such institutional sources can constrain objectivity, making it essential to apply critical scrutiny when using them in document-based research.

3.3. Analytical framework and evaluation criteria

We began by compiling a dataset of the leading fast-fashion retailers in the UK TFI who primarily sell clothing under their own brand. Identifying the top fast-fashion retailers in the UK is challenging, as much of the detailed data is behind paywalls. Publicly available lists often group together companies across different segments, including fast fashion, luxury fashion, footwear, sportswear, and multi-brand retailers. To overcome these challenges and identify the most influential fashion retailers operating in the UK market, we triangulated data from four sources: companiesmarketcap.com, ig.com, spocket.co, and retail-week.com (Companies Market Cap, 2024; IG UK, 2024; Mills, 2024; Spocket, 2024). Our analytical framework Table 3 draws from key components in our research question here marked in bold:

> *To what extent do* ***ecolabels*** *used by leading UK Textile and Fashion Industry (TFI) firms – through their choice of* ***metrics****, scope, and verification modes –* ***reliably*** *and* ***meaningfully*** *reflect the industry's documented* ***environmental pressures****, and what are the implications for improving sustainable business practices and policy interventions*?

This framework enables a comprehensive evaluation of ecolabel efficacy, balancing conceptual clarity with practical policy relevance.

Table 3. Analytical framework.

CATEGORY	QUESTIONS	DETAILS
Ecolabels	Which ecolabels are currently used by top UK TFI firms?	Type (e.g. value chain scope), material area (e.g. final Product (Garment), Component (Fiber), Process (Firm/Organisational level)), verification mode (third-party, first-party)
Metrics	What environmental dimensions are included within these ecolabels?	Coverage of environmental dimensions: GHG emissions, water use, chemical inputs, circularity (end-of-life waste management), biodiversity, etc.
Meaningfulness	Are the metrics relevant and understandable to stakeholders (e.g. firms, consumers, regulators)?	Stakeholder relevance, clarity of communication, perceived relevance
Reliability	Are the metrics scientifically robust and comparable across ecolabels?	Methodological soundness, transparency, consistency, data quality, verification mechanisms
Environmental Pressures	How well do ecolabel metrics reflect known environmental pressures from TFI activities?	Alignment with known environmental impacts, focus on. carbon emissions, and waste reduction.

Table 4 presents a composite view of top retailers across market segmentations. Retailers that function as warehouses or outlets selling multiple brands are not included as they themselves are unlikely to add ecolabels on branded products. Firms included in this study (highlighted in grey) were selected based on their consistent presence across sources, representation of key market segments (e.g., fast fashion, sportswear), and relevance to UK consumption patterns, as discussed below. In this study we include Next, Boohoo group, Primark, Levi's, H&M group, Inditex, Nike, Shein, and George. We assume the ecolabels they use, indicate the currently most used ecolabels.

Table 4. Top UK fashion retailers. Retailers included in this study are highlighted in grey.

SOURCE	RETAILER	MARKET SEGMENT
Top UK fashion retailers Source: companiesmarketcap.com (2024)	**Next plc**	**Fast-fashion**
	JD Sports Fashion	Sportswear
	Burberry	Luxury
	Capri Holdings	Luxury
	Boohoo Group	**Fast-fashion**
	ASOS	Brands retailer
	Perfect Moment	Sportswear
Top UK fashion retailers Source: ig.com (2024)	Burberry	Luxury
	Next	**Fast-fashion**
	ASOS	Brands retailer
	M&S	Brands retailer
	JD Sports	Sportswear
Top UK popularity brands Source: spocket.se (2024)	Adidas	Sportswear
	Levi's	**Fast-fashion**
	Next	**Fast-fashion**
	Nike	Sportswear
	Clarks	Shoes, accessories
	Primark	**Fast-fashion**
	George	**Fast-fashion**
	North face	Sportswear
Top UK fashion retailers ranked by sales forecast for 2027/28 Source: retail-week.com (2024)	**Next**	**Fast-fashion**
	Marks & Spencer	Brands retailer
	TK Maxx	Discount brands retail
	Frasers Group	Brands retailer
	Primark	Sportswear
	JD Sports	Brands retailer
	John Lewis	Brands retailer
	Shein	**Fast-fashion**
	Inditex	**Fast-fashion**
	H&M Group	**Fast-fashion**

Using a comparative approach, we assess whether ecolabel claims align with the sustainability metrics outlined by Purnell et al. (n.d.) and whether business targets are in line with global targets, as summarised in Table 1[1]. This will involve identifying discrepancies between ecolabel standards, industry-wide sustainability data, and the broader, long-term global sustainability targets. We will conduct a gap analysis to determine where ecolabels

[1] A detailed list of business targets that can contribute to resilient system-change goals is found in Appendix C, Box A.

either overstate, understate, or omit key environmental impacts. This analysis helps us evaluate whether ecolabels provide a comprehensive representation of actual environmental outcomes or selectively highlight certain sustainability aspects while neglecting others, particularly in relation to the broader global sustainability objectives.

4. Analysis and Discussion

4.1. Overview of ecolabels used by UK TFI firms

This section outlines the ecolabels referred to in the 2023–2024 sustainability reports of the identified top UK-based TFI firms, (see Table 5). The ecolabels identified serve as the focus of our subsequent analysis. We briefly describe each ecolabel's scope, material or process focus, and the type of metrics or verification mechanisms they employ. Tables B–H in the Appendix provide additional comparative summaries aligned with our analytical framework

Table 5. UK fashion retailers, and the ecolabels they refer to in their 2023/2024 sustainability reports.

FIRMS	ECOLABELS						
	Better Cotton Initiative (BCI)	Global Organic Textile Standard (GOTS)	Oeko-Tex Standard 100	Organic Content Standard (OCS)	Global Recycled Standard (GRS)	Recycled Claim Standard (RCS)	Responsible Wool Standard (RWS)
Inditex	Yes	Yes		Yes		Yes	Yes
Boohoo	Yes						
Next	Yes					Yes	Yes
Levi's	Yes						
H&M	Yes	Yes	Yes[1]	Yes	Yes	Yes	Yes
Primark		Yes		Yes		Yes	
Shein							
Nike	Yes[2]						
George / Asda	Yes	Yes	Yes[3]	Yes		Yes	

The Better Cotton Initiative (BCI, 2023) functions primarily at the farm level, verifying cotton fibres, and operates under a mass-balance chain of custody system. In this system, a spinner may purchase a given volume of Better Cotton and blend it with conventional cotton during processing. The certified quantity, for example, 10 tonnes, is logged and tracked through a chain-of-custody platform, enabling an equivalent volume to be credited throughout the supply chain. This allows retailers to make sourcing claims regarding their use of Better Cotton. However, as the system does not preserve the identity of the actual fibre, the certified cotton is not physically traceable to specific final products. This practice may lead to *greenlighting*, where positive sourcing claims are highlighted, but key limitations, such as the lack of product-level traceability, are omitted. Nonetheless, the system is subject to third-party auditing to ensure that the volume of sourcing claims does not exceed the volume of certified input purchased. BCI promotes improved practices with respect to local contexts in natural resource management, land use, crop protection and climate change mitigation and adaptation. It does not directly measure environmental outcomes or report material/product level impacts, but does require producers to report inputs (pesticides, fertiliser and water) and outputs (yield) from which such impacts could at least in theory be calculated or estimated. However, the organisation's impact reports (BCI, 2024a) do not directly calculate improvements in e.g. water quality or carbon emissions but provide statistics on reduction of "harmful" pesticide use or narrative descriptions of how improvements are moving towards the stated aim of halving the GHG emissions per tonne of cotton lint. Verification is conducted by third-party assessors, and while the ecolabel is meaningful to industry stakeholders, its scientific reliability is moderate due to its process-based nature. Nonetheless, it aligns moderately well with environmental pressures linked to climate change and water use.

In contrast, the **Global Organic Textile Standard** (GOTS, 2023) can be used to certify both fibre content, a finished garment, or intermediate processes, depending on how it is applied. As such it may cover the full value chain – from farm to finished product including a comprehensive set of environmental dimensions, such as greenhouse gas emissions, water and chemical use, biodiversity, and soil health. Some of these have prescribed limits for compliance (e.g. a general maximum chemical oxygen demand for wastewater) while other just have a requirement for measurement and monitoring (e.g. energy and water demand) or for an improvement plan (e.g. GHG emissions). The GOTS brand has high recognition among both consumers and industry and is underpinned by standardised methodologies. GOTS demonstrates an alignment with known environmental pressures from textile production and consumption.

The **Oeko-Tex Standard 100** (OEKO-TEX, 2024) focuses specifically on product-level chemical safety, ensuring that substances harmful to human health such as banned chemicals, carcinogens, heavy metals, formaldehyde, certain pesticides, or phthalates are excluded from final garments. While its relevance to consumer health is high, its environmental contribution is indirect, and thus its alignment with broader sustainability pressures is limited. Nevertheless, its methodological reliability is strong due to rigorous laboratory testing protocols.

The Organic Content Standard (OCS) (Textile Exchange, 2020) is a chain-of-custody certification that verifies the presence of organic material in a product. There are two label types: *OCS Blended* (for products containing 5–94% organic content) and *OCS 100* (for products with 95–100% organic content). The standard does not assess environmental or social impacts beyond the origin of the fibre. Instead, its function is to ensure that organically grown inputs have been properly identified and tracked through the supply chain. While OCS claims to support consumer-facing labelling, its actual relevance to end users is debatable, given that the environmental impacts of the remaining product content (which may be conventional fibre or other materials) remain unknown. Consequently, its stakeholder utility may be more pronounced in B2B contexts than for consumers.

The Recycled Claim Standard (RCS) (Textile Exchange, 2017a) has a similar function as the OCS, certifying the presence of recycled material in a final product, again using two label types: *RCS Blended* (5–94% recycled content) and *RCS 100* (95–100%). Like the OCS, it only verifies material traceability and does not measure environmental outcomes. The standard explicitly states that it "*does not address social or environmental aspects of processing and manufacturing, quality, or legal compliance*". It operates on the assumption that recycled content delivers environmental benefits by default, but this remains unverified. As with OCS, the meaningfulness of certifying as little as 5% recycled content is limited, especially when the content or the environmental impacts of the remaining 95% are disclosed. Despite being framed as a consumer-facing label, its clarity and comparability are limited, and its primary utility may lie in B2B validation.

The **Global Recycled Standard** (GRS)[2] (Textile Exchange, 2017b) verifies recycled content in a final product and sets additional requirements for chemical use during processing. While the technical specification states a minimum of 20% recycled content is required for certification, only products containing 50% or more are eligible to carry the consumer-facing GRS label, this discrepancy often overlooked, as the 50% threshold is featured more prominently on the organisation's website. A GRS certification at the 20% threshold is primarily applicable in B2B contexts. While products with less than 50% recycled content can't carry consumer-facing GRS labels, businesses still use the certification mainly to meet internal targets and make external claims like '*X% of our materials will be recycled by 2025*' – a form of greenlighting that highlights positive intentions but obscures the limited transparency for consumers. GRS applies across the value chain and is third-party certified. Although it does not quantify environmental outcomes, it includes more rigorous methodological safeguards by auditing not only the chain of custody but also environmental practices within processing facilities (e.g. record keeping of energy/water consumption, wastewater quality and treatment, emissions to air and waste management). This broader scope gives it stronger methodological credibility compared to basic traceability schemes like the RCS, which verify content origin without assessing process-level sustainability impacts. While its alignment with broader environmental pressures remains limited, the GRS has high relevance for B2B stakeholders and moderate recognition among informed consumers.

Lastly, the **Responsible Wool Standard** (Textile Exchange, 2021) focuses on animal welfare and land management in wool production. It applies at the farm level and includes criteria related to land use, biodiversity, and the ethical treatment of animals. Although its market uptake remains limited, the standard is grounded in evidence-based practices and aims to mitigate some key ecological impacts associated with animal fibre systems.

Most of these ecolabels operate as pass/fail schemes: they verify whether a product or producer meets a given set of minimum criteria, but they do not offer comparative metrics that allow stakeholders to evaluate performance across time, between products, or across

[2] The Global Recycled Standard is currently in transition to the *Materials Matter Standard*, as announced by Textile Exchange. However, since the *Materials Matter Standard – Pilot Version 1.0* was only released publicly on 4 June 2024 (https://textileexchange.org/materials-matter-standard-pilot/), and this analysis focuses on corporate sustainability reports from 2023/24, GRS remains the relevant standard for this study

labels. For example, in initiatives such as BCI, compliance centres on participation in training and self-monitoring practices rather than the achievement of externally verified performance targets. Farmers are encouraged to track metrics such as water use or pesticide application but typically set their own improvement goals. We found no public evidence of removal from the scheme for failing to meet such goals.

In addition, many of the ecolabels that claim to verify 'organic' or 'recycled' content do so based on adherence to other external standards for instance, the USDA National Organic Program (ECFR, 2025), EU organic regulations (EU, 2007), or ISO 14021's definition of recycled content (ISO, 2021). These ecolabels verify chain-of-custody documentation rather than certifying the environmental impacts of the materials themselves. This means consumers and stakeholders must consult multiple layers of documentation to fully understand the basis of a given claim, hindering transparency and comparability.

Together, these features limit the communicative power of ecolabels in enabling clear and consistent assessments of relative sustainability. They also raise important questions about what is actually being certified: the presence of a certain material, the integrity of a supply chain, or meaningful environmental performance. These limitations are crucial to highlight, as they shape how ecolabels are interpreted and used by all stakeholders within the TFI.

4.2. Environmental metrics in ecolabels

We anticipated finding data that would help us to conduct a quantified assessment of the mitigation potential of commonly used ecolabels, e.g. the degree to which a labelled product might have a lower carbon or water footprint than an unlabelled product. However, we found that ecolabel criteria do not, in the vast majority of cases, require compliance with quantifiable environmental performance metrics. Where such data is mandated to be collected as part of the scheme, an analysis thereof does not seem to be required to be reported either as a physical or digital part of the label. Nor do the TFI firms reveal to which extent they use each ecolabel.

Ecolabels at best present 'result indicators' without disclosing the underlying data or methodology. For example, Better Cotton (2020, p. 11) states in an impact report presumably based on data collected as part of its labelling scheme that certified farmers in Tajikistan use 16% less water (m^3/ha) compared to the average non-Better Cotton farmer. However, the report does not provide the actual figures or data supporting this claim, making it impossible verify their statements.

Ecolabels generally require verification that a fibre or product complies with predefined standards, often through a checklist approach confirming that specified criteria have been met. For example, Better Cotton mandates that "*Irrigation methods, technologies and timing are planned and implemented to improve irrigation efficiency and maximise water productivity*" (BCI, 2023, p. 93).

Where targets or quantifications are involved, firms often set their own benchmarks, such as requiring organisations to "*set and meet targets for meaningful improvements in energy use and review progress annually*" (Textile Exchange, 2017b, p. 28). However, these targets frequently lack clear guidance on the scale, measurement, or reporting of improvements. Moreover, we find no evidence that failure to meet such targets has lead to certification renewal being denied.

This reliance on loosely defined targets and procedural checklists, focused mainly on inputs like energy, water, and chemicals, highlights a broader issue with ecolabels: a lack of robust, standardised metrics and enforcement mechanisms. Circularity and biodiversity indicators are rarely integrated, and social or economic criteria often overshadow environmental targets. This inconsistency undermines the reliability and credibility of ecolabels as tools for meaningful environmental improvement.

4.2.1. Comparing natural fibre ecolabels in the UK FTI

Table 6 below, summarises key differences between the three most prominent natural fibre standards used by UK TFI firms, GOTS, Better Cotton, and OCS, highlighting divergences in traceability, environmental ambition, and scope.

Table 6. Differences between the natural fibre standards used by UK FTI (BCI, 2023; EU, 2007; GOTS, 2023; ICAC, 2011; Shah et al., 2018).

ASPECT	GLOBAL ORGANIC TEXTILE STANDARD	BETTER COTTON	ORGANIC CONTENT STANDARD
Focus	Combines organic farming with processing, chemical, environmental, and social standards.	Promotes more sustainable practices within conventional farming systems.	Verifies the presence and amount of organic material in a final product.
Traceability & Transparency	Strong traceability from farm to final product.	Very limited traceability; relies on Mass Balance system.	Very limited traceability and limited transparency.
Measurement of environmental pressure	Practice-based; limited performance indicators.	Practice-based; data collected, outcomes not yet systematically assessed.	Not addressed; content verification only.
Use of GMOs	Prohibited.	Allowed.	Prohibited.
Soil health approach	Required.	Encouraged.	Not addressed; content verification only.
Synthetic Inputs	Prohibited in farming and restricted in processing.	Allowed.	Not addressed; content verification only.
Water and energy Use	Requires responsible water and energy use in processing (aligned with IFOAM[3] norms).	Encourages reductions; implementation varies.	Not addressed; content verification only.
Climate change mitigation	Very limited; not quantified.	Very limited; not quantified.	Very limited; not quantified.
Minimum organic content threshold	Minimum 70% organic fibres for GOTS label; 95% for "GOTS Organic" label.	Not applicable (not based on organic content)	OCS 100: ≥95% organic; OCS Blended: ≥5% organic.

[3] IFOAM, International Federation of Organic Agriculture Movements, is an international umbrella organisation for the organic agriculture movement. More information here: https://www.ifoam.bio/

Box 1. Ecolabels and the rise of *Regenerative agriculture* in the TFI

Regenerative agriculture refers to a suite of farming practices aimed at restoring and enhancing ecosystem health. According to the FAO (2022), it is grounded in five core principles: minimising soil disturbance; maintaining soil cover with vegetation or mulch; increasing plant diversity; keeping living roots in the soil year-round; and integrating animals into farming systems. These practices aim to improve soil structure and fertility, enhance biodiversity, and increase the resilience of farming systems to climate change. However, unlike organic agriculture, regenerative agriculture lacks a unified regulatory framework, making its application and interpretation highly variable.

In the context of natural fibre production for textiles, ecolabels and companies increasingly invoke the language of regenerative agriculture, though often in varying and imprecise ways. For instance, **Better Cotton** is not an organic standard, yet states: *"This Principle focuses on farming practices that protect and enhance soil health, water quantity and quality and biodiversity. It covers the core tenets of regenerative farming practices, aims for optimising and reducing use of fertilisers and seeks to ensure efficient use of water both in rainfed and irrigated farms"* (BCI, 2023, p. 31). While this might suggest alignment with regenerative ideals, Better Cotton does not require compliance with any standardised regenerative framework.

By contrast, **GOTS**, which certifies organic fibres, asserts that: *"The concept of regenerative is embedded in the philosophy and practice of organic, because organic farm management is designed to protect and nurture the land, animals, and the farmers we all depend upon"* (Thimm, 2024).

The critical distinction lies in regulation: ***organic*** **agriculture is legally defined** and certified under frameworks such as the EU Regulation (834/2007 (EU, 2007)), while ***regenerative*** **agriculture is non-standardised concept** susceptible to vague or misleading claims. This regulatory gap raises concerns around greenwashing, as some textile firms may co-opt regenerative language without demonstrable or verifiable outcomes.

We clarify this distinction in Table 7, which compares organic and regenerative agricultural systems across multiple dimensions, including certification mechanisms, inputs, soil health strategies, traceability, and their respective approaches to climate and biodiversity goals.

As noted by Bless (2023), there is a risk that regenerative agriculture, if dominated by corporate narratives and Global North perspectives, may become a tool for preserving existing power structures rather than driving transformative change. The use of lifecycle assessment (LCA) tools to evaluate regenerative claims remains limited. While LCA

Box 1. continued.

can quantify aspects such as carbon sequestration, emissions, and water use it struggles to account for more complex and qualitative outcomes – such as biodiversity restoration, soil microbial health, and ecosystem resilience – which are central to regenerative agriculture's goals (Sandin et al., 2019).

Table 7. Comparison of organic agriculture and regenerative agriculture

ASPECT	ORGANIC AGRICULTURE[4]	REGENERATIVE AGRICULTURE[5]
Regulatory Framework	Legally defined within EU law; standardised and enforced.	No unified standard or regulation.
Certification	State-accredited certifiers under EU regulation.	Certified by private organisations
Focus	Compliance with organic methods.	Outcomes-based ecological restoration.
Use of GMOs	Prohibited.	Mostly prohibited (varies by scheme).
Synthetic Inputs	Prohibited.	Mostly prohibited (varies by scheme).
Soil health approach	Encouraged via rotations, cover crops, organic matter.	Core goal – improved soil function, carbon sequestration.
Measurement of environmental pressure	Practice-based compliance, not outcomes.	Outcome-driven, measures for example soil carbon.
Water and energy use	No specific requirements.	Often referred to as part of whole-system thinking.
Climate change mitigation	Very limited; not quantified.	Explicit goal; targets soil carbon and reduced inputs.
Traceability & Transparency	Required from farm to first processor.	High transparency (varies by scheme).

4.3. Mapping ecolabels to value chain scopes

We find that firms, in their sustainability reports refer to *value chain* as a boundary. For example, H&M group (2024, p. 35) says that *"Decarbonising our value chain remains a core focus"*. In Nike's impact report (2024, p. 82) they clearly state their "*commitments to deliver significant emission reductions throughout our value chain*" and Inditex (2024, p. 18) writes

[4] Organic agriculture as defined by EU R834/2007 (EU, 2007).

[5] Regenerative agriculture as described by the Food and Agriculture Organization of the United Nations (FAO, 2022).

that ”*These estimates are used mainly to disclose emissions and consumption throughout the value chain”.* It would be useful to therefore be able to map the ecolabel according to value chain scopes as it would provide us with a clearer understanding of the environmental stages and tiers that each label addresses. This is particularly important given the complexity of global textile fashion value chains and the varying points at which environmental pressures occur. By identifying whether a label covers upstream or downstream activities, stakeholders can better evaluate the relevance, comprehensiveness, and limitations of each certification. This would support a more informed comparisons between labels, and help identify potential gaps in environmental accountability, and mitigate the risk of misleading claims about sustainability coverage. It is also in alignment with the growing emphasis on Scope 3 emissions and extended producer responsibility, offering firms and policymakers a tool to assess how well ecolabels support broader sustainability and policy objectives across a garment’s lifecycle.

Unfortunately, we find that this mapping is not possible to conduct. Ecolabel criteria do not refer to *value chain* nor do they clearly refer to value chain stages that are in line with firm’s boundaries.

Although ecolabels often claim to cover a broad range of sustainability issues, their actual scopes rarely align with the full value chain frameworks used in environmental impact assessment. Most labels address specific stages, such as farm-level practices (e.g. GOTS, Better Cotton, Responsible Wool Standard), material traceability (e.g. Organic Content Standard, Recycled Claim Standard), or chemical safety in finished goods (e.g. OEKO-TEX Standard 100), without encompassing the full lifecycle from raw material extraction to end-of-life.

Furthermore, ecolabels differ in the material stages they certify, whether raw fibres, fabrics, or final products, and in whether their claims are intended for B2B or B2C audiences, see Table 8. Some schemes apply only to earlier stages of the supply chain, such as raw fibres or fabrics, and are primarily intended for B2B use, where certification is communicated between supply chain actors rather than directly to end consumers. Others, including some governed by Textile Exchange, explicitly restrict label use to final products, allowing B2C claims only when certification requirements are fully met at the point of sale. This distinction matters, as it determines both where the ecolabel is applied in the production chain and how visible the sustainability claim is to the end consumer. Clarifying whether a label covers fibres, fabrics, or finished goods, and whether it is designed for B2B or B2C communication, is therefore essential for interpreting its role and scope.

Table 8. Summary of selected textile ecolabels by certification scope, material coverage, and allowance for B2C labelling. The table outlines what is verified by each scheme, examples of certified product stages (e.g. raw fibre, fabric, garment), and whether consumer-facing claims are permitted. B2C labelling is typically allowed only when specific chain-of-custody and certification requirements are met.

Ecolabel	What is verified	Examples of certified area	Targeting B2C audience
Global Organic Textile Standard (GOTS)	Certifies organic fibre origin and may also certify the final product, requiring that production stages after harvest – such as spinning, dyeing, weaving/knitting, finishing, and packaging – meet environmental and social criteria.	Raw fibres, Final product	**Yes** – B2C labelling permitted if full the supply chain is GOTS-certified
Organic Content Standard (OCS)	Verifies organic content through chain of custody; does not assess processing criteria	Raw fibre, yarn, fabric, final product	**Yes** – B2C labelling permitted if certification requirements are met
Responsible Wool Standard (RWS)	Certifies virgin wool at farm level, with forward chain-of-custody forward	Raw wool, yarn, fabric	**No** – B2B only (though some brands use claims in supporting communication)
OEKO-TEX Standard 100	Certifies chemical safety in final textiles; testing may occur at various stages	Fibre, fabric, final garments	**Yes** – B2C label widely used
Better Cotton Initiative (BCI)	Certifies farm-level under a mass balance system (not physically traceable)	Raw cotton; certification tracked via documentation	**Yes** – widely used in B2C marketing, though not linked to physical product content
Global Recycled Standard (GRS)	Verifies recycled content (pre-/post-consumer), and environmental/social practices in processing	Yarn, fabric, garments	**Yes** – B2C labelling permitted if certification requirements are met
Recycled Claim Standard (RCS)	Verifies recycled content only (pre-/post-consumer); no criteria for processing	Fabric, garments, accessories	**Yes** – B2C labelling permitted if certification requirements are met

This mismatch obstructs assessing the comprehensiveness of sustainability claims and limits the labels' effectiveness in guiding systemic environmental improvements. It also hinders comparisons between labels and makes it difficult for stakeholders to identify where environmental responsibilities are being assumed – or overlooked – along the value chain.

4.4. Scientific reliability of ecolabel environmental metrics

The scientific robustness of ecolabel metrics varies widely. Verifiable methodologies that support reproducibility and comparability is missing, in addition to inconsistent data collection, transparency and reporting, opaque criteria, and limited third-party validation. These discrepancies undermine the scientific reliability of ecolabels environmental metrics.

All ecolabels examined in this study meet a minimum threshold of credibility by being third-party verified. However, verification alone does not guarantee scientific integrity. The environmental validity of ecolabels is shaped by several interrelated aspects, including the methodological transparency of their assessment routines, the thoroughness of data inputs, and the alignment of metrics with relevant environmental pressures, including consistent and coherent reporting of data. Together these factors establish the extent to which ecolabels can provide accurate, reliable and policy-relevant information about sustainability outcomes.

A key challenge lies in the obscure absence of standardised frameworks for metric development and validation across ecolabel schemes. The lack of coordinated criteria results in use of different definitions, system boundaries, and measurement units, or indeed the omission of these aspects all together. This complicates cross-label comparison, obstructing the ability of stakeholders to assess outcomes. In some cases, ecolabels prioritise process-based indicators (e.g., the presence of management systems or farming practices) over outcome-based metrics that directly measure environmental impact (e.g., GHG emissions or water use reductions). This emphasis on inputs rather than verifiable outcomes limits the scientific reliability of ecolabel claims.

Moreover, the environmental dimensions covered by ecolabels are often incomplete. While many labels address high-visibility issues such as pesticide use or water consumption, very few include systems-level concerns such as biogeochemical cycles or cumulative ecological effects, and even those that reference land system change often do so without capturing the broader interdependencies within global biophysical processes. The neglect of these areas weakens the scientific foundation of ecolabel metrics and underrepresents critical sustainability challenges.

Finally, ecolabel methodologies are often developed in non-transparent ways and are not subject to peer-reviewed examination. This lack of openness impedes independent evaluation and raises questions about methodological soundness, especially when ecolabels are developed, funded, or verified by industry actors with potential conflicts of interest. Some ecolabels list their "steering committees" or similar governance bodies, which can be helpful for transparency; however, these committees are predominantly composed of industry representatives, effectively allowing the industry to mark its own homework.

Third-party certification has the potential to enhance credibility and transparency – if governance structures are clear and robust (Darnall et al., 2018; Kesidou and Palm, 2024). In practice, however, the distinction between second- and third-party verification is frequently blurred. The lack of transparency in relation to the relationships between businesses, certifying bodies, and ecolabel schemes undermines the independence of certification processes, particularly as brand representatives frequently hold positions on the boards of certifying organisations. Such overlaps raise concerns about impartiality and the overall reliability of ecolabel claims.

In sum, while ecolabels play an important role in signalling sustainability commitments within the TFI, their scientific reliability remains uneven. Strengthening the methodological foundations of ecolabel metrics, through transparency, standardisation, and alignment with environmental science, is crucial for these tools to contribute to meaningful environmental governance.

4.5. Case study: GHG accounting in certified plant-based fibre production

To evaluate whether certified plant-based fibres, particularly cotton, effectively reduce greenhouse gas (GHG) emissions compared to conventional practices, a comprehensive dataset is required. While the categories of data remain consistent across fibre types, specific values – such as water use, soil carbon, and fertiliser emissions – vary depending on regional practices and cultivation methods. Table 9 outlines the key data required for this assessment. Climate change also presents a growing business risk for the TFI, as its activities contribute to climate change while also being directly affected by it. Changing environmental conditions

– such as altered rainfall patterns, heat stress, and extreme weather – are already impacting cotton cultivation, creating risks across the entire value chain, see Figure 3.

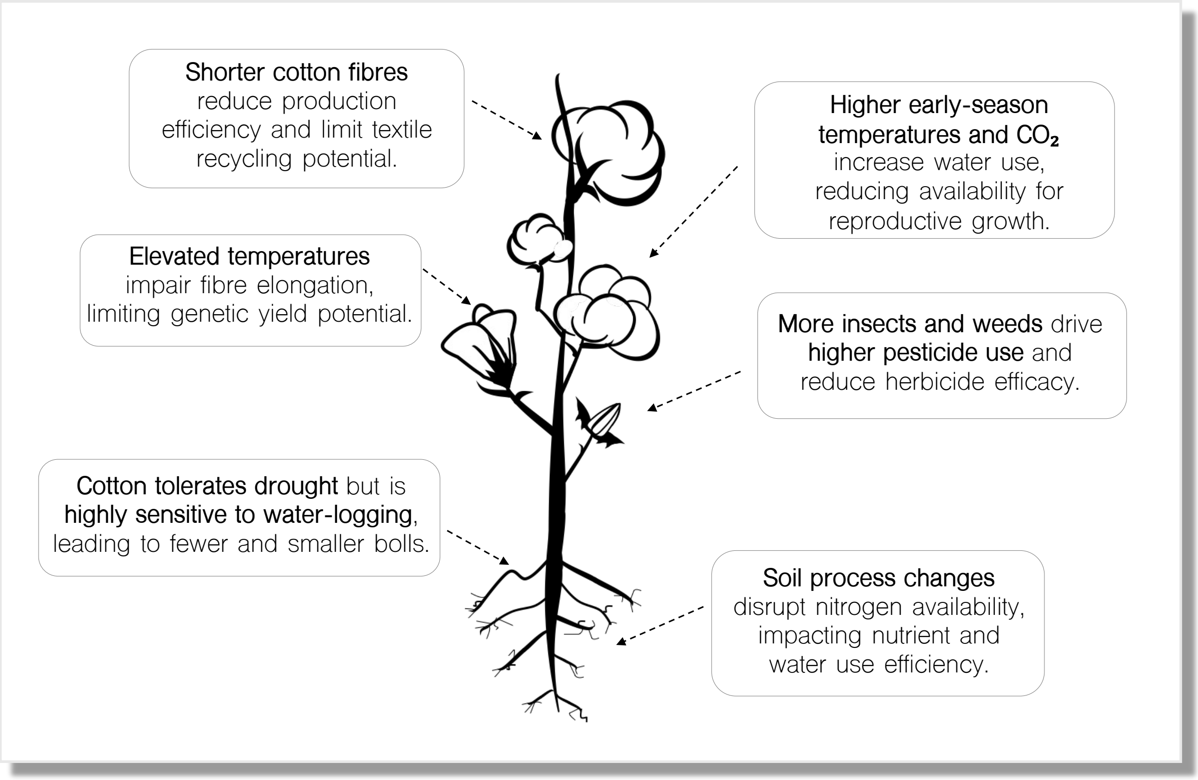

Figure 3. Climate and Business: A feedback loop

(Sources: Bange, 2016; Dai et al., 2017; International Trade Centre (ITC), 2011; Kooistra et al., 2006)

Cotton farming's high-water use, chemical inputs, and land impacts make it vital to assess whether certifications like organic or regenerative farming provide genuine environmental gains. Cotton plants absorb atmospheric CO_2 and soil nitrogen during growth, storing them in plant biomass and soil organic matter. However, these are re-emitted over time through natural processes such as respiration and decomposition. Farming practices – such as land clearing, synthetic fertiliser use, and post-harvest burning – can significantly increase emissions, particularly CO_2, methane (CH_4), and nitrous oxide (N_2O) (Bange, 2016; FAO, 2015). The latter two are especially potent GHGs, with global warming potentials approximately 28–34 (CH_4) and 265–298 (N_2O) times greater than CO_2 over 100 years (IPCC, 2022).

In contrast, climate-conscious cultivation practices – such as cover cropping, compost application, reduced tillage, and improved irrigation – may enhance soil carbon sequestration and reduce emissions (FAO, 2015, 2022). The effectiveness of these methods must be evaluated through empirical data on key emission sources and carbon sinks.

Key variables include soil organic carbon levels (and their change over time), biomass carbon content (both above and below ground), and the rate of carbon sequestration. Data on nitrogen fertiliser application rates, types, and resultant N_2O emissions – alongside metrics of nitrogen use efficiency – are crucial. Given the role of irrigation in creating anaerobic soil conditions, it is also necessary to monitor water use, drainage, and irrigation techniques to assess potential CH_4 emissions (Chapagain et al., 2005; Kooistra et al., 2006).

Additionally, land-use change data – particularly related to deforestation and soil disturbance – is vital for estimating CO_2 release (IPCC, 2022). The management of crop residues also influences emissions: whether residues are incorporated, left to decompose, or burned affects CO_2, CH_4, and N_2O outputs. Furthermore, data on mechanisation – such as fuel and energy used during field operations – should be collected to account for direct emissions.

To compare certified and conventional cotton farming, robust baseline data from conventional systems is needed, supported by lifecycle assessments (LCAs) that capture all relevant inputs and outputs (Purnell et al., n.d.). Using such data in conjunction with IPCC methodologies and region-specific emission factors allows for a meaningful evaluation of whether certified cotton practices result in lower GHG emissions and overall environmental improvement.

Table 9 summarises data required to support reliable greenhouse gas (GHG) accounting in cotton production. Each row identifies a specific data point, its relevance for estimating environmental impacts, particularly GHG emissions, and the related agricultural practices that impact or generate the relevant data. These data points underpin the development of scientifically robust indicators and are necessary to assess the environmental performance of cotton production practices in a transparent and verifiable manner, particularly in the context of ecolabel criteria.

Table 9. Key data required for GHG accounting in certified cotton fibre production (Bange, 2016; FAO, 2015; Kooistra et al., 2006).

DATA NEEDED	PURPOSE	RELEVANT PRACTICES
Fertiliser application rates	To assess the amount and type of nitrogen-based fertilisers used.	Use of synthetic vs. organic fertilisers, nitrogen management practices
Water use and irrigation practices	To evaluate water use and potential emissions from irrigation methods, including CH_4 and N_2O fluxes.	Drip irrigation vs. flood irrigation, water management practices
Land use and conversion	To assess the impact of land-use changes such as deforestation	Land clearing for cotton farming, deforestation, land management practices
Crop residue management	To track emissions from crop residues based on handling methods.	Decomposition, residue burning, incorporation into the soil
Soil carbon content	To assess changes in soil organic carbon and carbon sequestration over time.	Cover cropping, reduced tillage, improved soil management
Biomass carbon accumulation	To assess carbon stored in above-ground and below-ground biomass.	General cotton farming, different cultivation practices (BCI vs. conventional)
Fuel and energy use in field operations	To assess emissions from mechanisation, including fuel consumption for cultivation and harvesting.	Mechanisation intensity, fuel use efficiency
Rate of carbon sequestration	To evaluate the extent to which carbon is sequestered in the soil over time.	BCI practices such as organic fertilisation, regenerative practices
Nitrogen use efficiency	To assess how efficiently nitrogen is used e.g. reducing excess N_2O emissions.	Improved fertiliser application techniques, soil health management
Nitrous oxide emissions from soils	To track nitrous oxide emissions resulting from fertiliser application and soil management.	Fertiliser application, irrigation practices, residue management

Findings from a desktop review of leading UK fashion retailers suggest that many ecolabels remain largely invisible to end consumers. For example, although the OEKO-TEX Standard 100 and the Global Recycled Standard are occasionally referenced in B2B communications, they are rarely highlighted at the point of sale on consumer-facing platforms. This reflects their stronger relevance in value chain traceability and regulatory compliance, rather than in shaping consumer perceptions or driving demand.

The H&M Group, for instance, mentions OEKO-TEX certification in its 2024 Sustainability Report, particularly in relation to investment in a biotech company producing OEKO-TEX-certified dyes. However, a review of H&M's online product listings [accessed 26/03/2025] found no products advertised as OEKO-TEX certified, suggesting a disconnect between back-end certification and front-end communication. Similarly, Nike does not display ecolabels prominently on its website [accessed 14/03/2025] or in its 2023 Sustainability Report, though it has been a member of the Better Cotton Initiative (BCI) since 2010, according to BCI's membership records.

George at ASDA does not appear to directly participate in OEKO-TEX certification schemes. The label is reportedly used on a limited and unspecified range of denim products, purchased from suppliers independently engaging with OEKO-TEX. This illustrates how ecolabels can function in value chains without being leveraged as a consumer-facing sustainability signal.

Overall, these patterns suggest that the stakeholder relevance of ecolabels varies by audience. While certain certifications (e.g., OEKO-TEX, BCI) have high recognition among B2B stakeholders, their consumer impact remains muted, due to both low visibility and limited public understanding. Certifications that focus on traceability rather than measurable environmental outcomes – such as the Recycled Claim Standard – also offer less meaningful guidance for consumers seeking to assess a product's environmental performance.

4.6. Synthesis: Do ecolabels reflect the TFI's environmental pressures?

Drawing on criteria such as label type and scope, value chain coverage, environmental dimensions addressed, metric specificity, stakeholder relevance, and scientific credibility, Table 10 provides a comparative overview. This synthesis enables a systematic evaluation of ecolabels' capacity to meaningfully capture and communicate the environmental impacts of UK TFI practices, while also indicating their utility for stakeholders including consumers, firms, and policymakers.

Our analysis reveals significant variation in both the comprehensiveness and scientific robustness of existing ecolabels, as well as inconsistencies in their alignment with environmental pressures and policy goals. While many schemes address themes such as chemical inputs, biodiversity, and water use, they often lack the methodological rigour or value chain breadth required for a holistic assessment.

Most ecolabels focus on cradle-to-gate processes, particularly those associated with fibre production, with limited attention to end-of-life or circularity metrics. As shown in Table 10, the absence of lifecycle-based metrics and outcome verification in many ecolabels limits their scientific reliability and policy relevance.

The case of the Better Cotton Initiative illustrates these limitations. Widely adopted by UK TFI firms, BCI's mass balance system prevents consumers from tracing certified cotton in specific garments. While it signals that a brand sources at least 10% of its cotton as Better Cotton, it offers no guarantee that any given product contains certified fibre (BCI, 2024b, 2023). As a result, consumers may unknowingly buy garments containing conventionally produced cotton, despite supporting more sustainable farming financially.

Moreover, although BCI's 2023 Annual Report maps its criteria to climate outcomes, it has yet to demonstrate measurable GHG reductions. The report (BCI, 2024b, p. 19) acknowledges this gap:

> To reduce GHG emissions by 50% per tonne of Better Cotton lint by the end of the decade, our focus this year has been on developing the methodologies and tools that will enable the needed reductions.

Current efforts focus on piloting GHG reporting tools, aligning with the GHG Protocol and Science Based Targets Initiative, and exploring carbon credit schemes – though these remain in development with no verified results yet.

In conclusion, while ecolabels in the UK TFI sector show growing awareness of environmental impacts – particularly at the production stage – they remain constrained by methodological weaknesses, limited outcome data, and insufficient transparency. These gaps pose challenges for regulators aiming to integrate ecolabels into sustainability frameworks and for firms seeking to substantiate performance claims.

Table 10. Summarising key findings for ecolabels used by top UK TFI.
Table is in alignment with the categories the analytical framework. Sources: Better Cotton, 2023; GOTS, 2023; OEKO-TEX, 2024; Textile Exchange, 2021, 2020, 2017b, 2017a.

Ecolabel	Type	Examples of certified area	Environmental dimensions	Metrics used	Alignment with environmental pressures	Stakeholder meaningfulness	Scientific reliability
Global Organic Textile Standard (GOTS)	Farm to product-level	Raw fibres, yarn, final product	Biodiversity, water, chemical inputs, land system change	**None** – codified organic practices	**High** - broad and integrated with key pressures	**High** B2B - High recognition B2C - High recognition	**High** – standardised certified practices
Organic Content Standard (OCS)	Chain-of-custody (organic content only)	Raw fibre, yarn, fabric, final product	Not specified – organic input only	**None** – input verification only	**Low** – no process or impact assessment	**Low** B2B - Moderate value B2C - Low relevance	**Moderate** – traceability assured but not performance-based
Responsible Wool Standard (RWS)	Farm-level	Raw wool, yarn, fabric	Biodiversity, land system change, water, chemical inputs	**None** – guidance on practices only	**Moderate** – aligns with core issues but lacks outcome data	**Moderate** B2B - High recognition B2C - Low consumer awareness	**Moderate to High** – evolving evidence base, practice-based
Oeko-Tex Standard 100	Product-level (chemical safety)	Fibre, fabric, final garments	Chemical inputs (toxicity, banned substances)	**None** – Lab-based substance testing	**Low** – addresses human safety, not systemic environmental pressures	**High** B2B - High recognition B2C - High recognition (health focus)	**High** – lab based testing and regularly updated
Better Cotton Initiative (BCI)	Farm-level (mass balance system)	Raw cotton; (volumetrically tracked via documentation)	Biodiversity, water, chemical inputs, land system change	**None** – practice based reporting	**Moderate** – covers key inputs but lacks measurable outcomes	**Moderate** B2B - High relevance B2C - Moderate recognition	**Moderate** – standardised practices, limited outcome data
Global Recycled Standard (GRS)	Product + processing	Yarn, fabric, garments	Recycled content (>20%), chemical inputs	**None** – verification only	**Low** – addresses chemical inputs not outputs, broader scope than basic traceability	**Moderate** B2B - High recognition B2C – Low understanding	**High** – certified traceability, clear chain-of-custody
Recycled Claim Standard (RCS)	Chain-of-custody (recycled content only)	Fabric, garments	Recycled content only (>5%)	**None** – input tracking only	**Low** – no verification of environmental pressures or benefits	**Low** B2B - Moderate value for value chain traceability B2C – Low understanding	**Moderate** – traceability verified, no performance data

5. Interpreting the findings

5.1. The DPSIR Framework – linking sustainability pressures and responses

To strengthen the policy relevance of the ecolabel assessment (Table 10), we apply the DPSIR (Drivers, Pressures, States, Impacts, Responses) framework, a systems-based model widely used for environmental analysis (European Environment Agency, 2005; Kristensen, 2004). This framework (Figure 4) situates ecolabels within broader environmental and socio-economic dynamics, offering a structured perspective on their role in the UK TFI.

The adoption of ecolabels reflects a **Response** to multiple **Drivers**, notably the pursuit of profitability within global fashion value chains. Consumer demand, fast retail cycles, and resource-intensive production systems further drive unsustainable practices. Ecolabels have emerged as firms seek to balance these commercial imperatives with mounting calls for transparency and sustainability.

Many of the ecolabels assessed aim to address environmental **Pressures** such as water use, chemical inputs, land conversion, and biodiversity loss. However, key **Pressures** – including fertiliser use, GHG emissions, and atmospheric pollution – remain only partially addressed.

Changes in environmental **States** – such as climate change, biodiversity loss, and water scarcity – result from these accumulated **Pressures**. Yet, few ecolabels demonstrate measurable links between certification and improvements in these **States**, largely due to the absence of outcome-based indicators and traceable data.

The degradation of environmental **States** feeds back into the TFI through rising production costs, supply chain disruptions, and increasing consumer and regulatory scrutiny. This positions ecolabels as risk management tools, enabling firms to signal responsible behaviour and navigate reputational and operational risks.

Our analysis highlights that ecolabels function within complex societal **Responses** involving consumer expectations, market dynamics, and policy priorities. As seen in Table 10, some ecolabels demonstrate greater credibility due to independent verification, stronger scientific foundations, and broader stakeholder recognition. Others, however, show weaker alignment with key environmental pressures, particularly where they lack outcome-based metrics or product-level traceability.

Importantly, our DPSIR framework (Figure 4) also underscores the role of ecolabels in shaping cultural shifts and promoting verifiable claims. While some labels are better positioned to influence consumer behaviour and corporate priorities, their effectiveness remains limited by gaps in transparency, standardisation, and methodological rigour.

A key insight from this DPSIR analysis is that Responses – by firms, consumers, and policymakers – are typically triggered by experienced Impacts rather than upstream Pressures alone. This raises questions about the communicative function of ecolabels: if they focus solely on reducing production-level **Pressures**, without connecting these to broader environmental or societal **Impacts**, their ability to drive meaningful change is likely to remain limited.

5.2. Communication implications for ecolabelling

Ecolabels must communicate effectively to different stakeholder groups. For **businesses**, B2B users, this means providing credible, standardised, and verifiable information that supports procurement, risk assessment, and sustainability goals. Key elements include certified chain-of-custody systems, alignment with recognised reporting frameworks, and evidence of environmental outcomes beyond regulatory compliance.

For **policymakers**, ecolabels need to provide transparent, comparable indicators that can inform regulation and track sustainability progress across sectors. These indicators must align with policy priorities such as climate mitigation, biodiversity protection, and circularity.

For **consumers** (B2C), ecolabels must go beyond logos to clearly show how purchasing choices relate to environmental and social benefits. This requires contextualising pressures and impacts, substantiating claims with accessible evidence, and offering guidance on complementary actions like repair, reuse, and responsible disposal.

Drawing on the DPSIR framework, four key communication gaps emerge that must be addressed to strengthen consumer responses:

- **Link Pressures to Impacts:** Ecolabels should explain how pressures such as carbon emissions or chemical use lead to concrete environmental harms like biodiversity loss or health risks.
- **Communicate Environmental Context:** Labels must clearly situate their claims within the broader environmental challenges they seek to address, such as TFI's overall GHG footprint.
- **Show Effects:** Verifiable evidence of actual environmental improvements, such as reduced emissions or chemical use, is essential – but currently rare.
- **Support Behaviour Change:** Ecolabels should encourage actions beyond purchase, such as repair, reuse, and responsible disposal, to foster systemic change.

In sum, ecolabels need to go beyond addressing environmental pressures and adopt a full causal chain perspective – tracing links from Pressure through State, Impact, and Response – to show why specific actions matter. Effective schemes make environmental conditions visible, link **Impacts** to real-world experiences (**States**), and offer clear, actionable guidance (**Responses**). Aligned with circular economy principles, ecolabels need also to prioritise upstream solutions that prevent harm and promote production and consumption models focused on reduction and reuse. However, as shown in Sections 4.2–4.4, most ecolabels still fall short of contributing to such system-level change. The DPSIR framework reveals these shortcomings not simply as technical gaps, but as deeper misalignments between ecolabelling practices and the complex sustainability challenges facing the TFI.

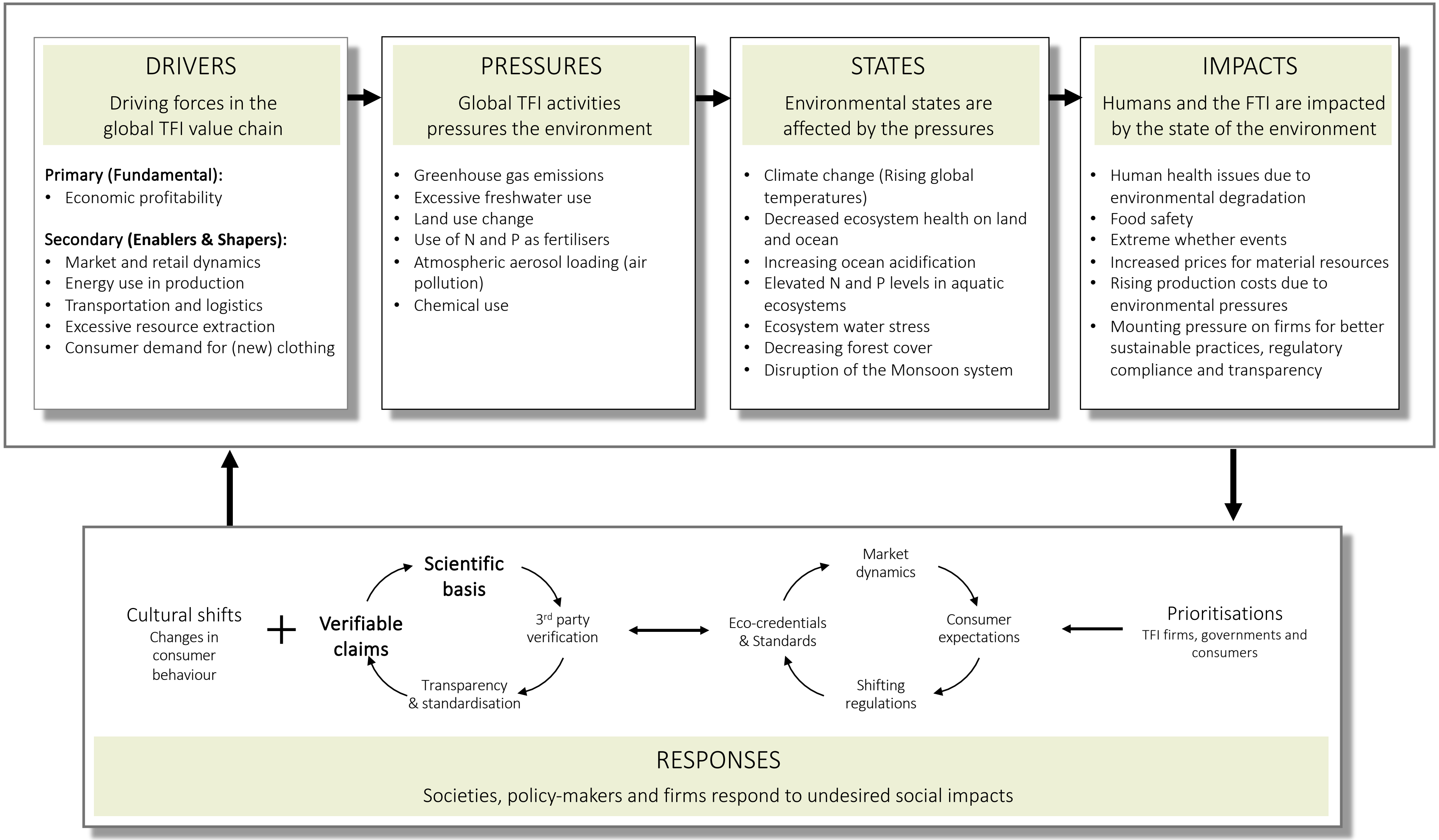

Figure 4. The DPSIR framework applied to the global TFI.

Our focus on the scientific basis of ecolabel claims and the extent to which these claims are verifiable are enlarged and in bold.

6. Conclusions and Recommendations

Our analysis finds that while ecolabels are increasingly used to sustainability, **most do not provide a reliable or comprehensive reflection of the environmental pressures linked to the TFI's global value chains**. Ecolabels with rigorous, science-based criteria and third-party verification remain niche, while more widely adopted schemes often depend on procedural standards and mass-balance traceability, lacking robust outcome metrics or alignment with environmental pressures.

This disconnect is significant given the extensive and well-documented pressures linked to the TFI, including greenhouse gas emissions, water stress, biodiversity loss, land system change, and chemical pollution. Ecolabels continue to focus on production processes or fibre type, rather than measurable reductions in these systemic pressures. Furthermore, **they show little evidence of integration with scientifically validated data frameworks or corporate sustainability reporting standards**, which limits their credibility as tools for environmental governance. Moreover, this misalignment facilitates *green-ish practices* such as greenwashing, greenwishing, greenlighting, and greenhushing, which undermine trust and dilute the potential for genuine environmental progress.

Applying the DPSIR framework reveals that **most ecolabels focus on Pressures**, while without adequately reflect changes in State or communicating Impact. This limits their capacity to trigger effective Response from both consumers (B2C) and firms (B2B). People are more likely to change their behaviour when they perceive clear links between ecolabelled actions and real-world environmental improvements – links which are currently underdeveloped.

In summary**, ecolabels used by leading UK TFI firms only partially and inconsistently reflect key environmental pressures** due to limited metric design, scope, and verification. This weakens their capacity to support credible environmental improvement. **Enhancing the effectiveness of ecolabels will require a shift towards science-based criteria, outcome-focused verification, and clearer communication of environmental impacts.** These changes are essential if ecolabels are to function as legitimate governance tools capable of influencing both FTI production and consumption.

6.1. Recommendations for Policy and Industry Practice

Align ecolabel criteria and verification with science-based environmental metrics
Ecolabels need to be grounded in globally accepted indicators of environmental pressure – such as GHG emissions, water extraction, land use, and chemical load – and report transparently on performance. This includes moving beyond procedural standards with checklist-style reporting tools or compliance exercises, to mandate third-party verified, outcome-based metrics that reflect real-world environmental changes across the value chain.

Improve traceability and integrity in ecolabelling systems
To maintain credibility, ecolabels using mass-balance or blended traceability models need to enhance transparency regarding input ratios, certified material flows, and associated impacts. Where full chain-of-custody is not feasible, clear documentation and robust auditing mechanisms are crucial to prevent greenwashing.

Strengthen consumer communication by linking environmental pressures to actual outcomes
Ecolabels need to make explicit the environmental benefits associated with certified products by for example, showing how reduced water use contributes to healthier ecosystems. Such framing supports behaviour change by helping consumers and businesses connect ecolabel choices with real-world impacts.

Support the scaling of high-integrity ecolabels through policy and market instruments
Government and industry can accelerate uptake by prioritizing ecolabels with strong environmental alignment in procurement, taxation, and trade. Additionally, ecolabels promoting circularity need to shift from focusing solely on recycling towards metrics that support durability, reuse, and upstream impact prevention, contributing towards systemic change.

6.2. Study limitations and directions for future research

This study's reliance on secondary data – which is fragmented with evident biases, as noted throughout. Direct engagement with business actors – particularly to gather primary data on value chain practices – and other TFI stakeholders would provide valuable triangulation and strengthen the findings. Future research needs to therefore:

- **Policy** – Conduct interviews with industry actors to validate metric relevance and challenges and identify implementation challenges.
- **Business** – Undertake empirical case studies to assess links between ecolabel claims and measurable environmental outcomes.
- **Academic** – Explore advanced methodologies such as Q-methodology to capture diverse stakeholder perspectives.

Although the environmental pressures of the TFI remain poorly understood, there has been little investigation into why this opacity persists. Yet, both policymakers and consumers increasingly demand transparency on the environmental impacts of textile production and consumption. While the TFI claims to be addressing these concerns, concrete results remain limited.

This study also raises questions about the financial and institutional arrangements underpinning ecolabel certification. For example, Inditex (2024b, p. 4) states that it "*only works with manufacturers of cellulosic fibres that meet the strictest criteria*" and "*only accepts cotton that conforms to the following standards*," suggesting a reliance on upstream suppliers for compliance. It remains unclear whether major brands themselves fund certification, or whether the costs are fully borne by suppliers. If the latter, it raises concerns about delegated compliance – where large international firms claim sustainability leadership while shifting the financial burden onto suppliers. This is particularly problematic for small and medium-sized enterprises (SMEs), for whom certification costs can represent a significant barrier. Understanding who pays for certification, and at what point in the value chain, is essential for assessing accountability and the incentives shaping ecolabel adoption.

Relatedly, Kesidou and Palm (2024, p. 27) note transparency issues in the organisational structures of certification bodies, particularly among for-profit verifiers, who are often less forthcoming about their ownership and governance than non-profits. This lack of clarity may undermine consumer trust and raises questions about the credibility and independence of certification schemes. Further research into these financial and institutional dynamics would offer critical insights into how responsibility for ecolabel governance is distributed among brands, suppliers, and third-party bodies.

Finally, future research should examine the link between transparency and environmental performance. Would enhanced transparency meaningfully reduce environmental harm – and if so, through what mechanisms? Despite widespread recognition of environmental challenges, many TFI firms consistently fall short of their own sustainability targets. This suggests persistent institutional and structural barriers. Understanding why progress remains limited, and whether greater transparency could drive meaningful change, is an urgent research priority.

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Appendices

A. Theoretical and Conceptual Foundations

This report is grounded in an analytical framework informed by critical realism, systems thinking, and the DPSIR (Drivers–Pressures–State–Impact–Response) framework. These conceptual foundations ensure that the limitations and possibilities of ecolabels are examined with both depth and contextual sensitivity, allowing for a nuanced understanding of their function within the UK Textile and Fashion Industry (TFI).

Critical realism as metatheoretical basis

Critical realism (Bhaskar, 2016) underpins our ontological and epistemological approach. It offers a layered model of reality that distinguishes between the *empirical* (what is observed), the *actual* (what occurs), and the *real* (the underlying causal mechanisms). This is particularly appropriate for analysing ecolabels, which represent observable claims or metrics, but often rest upon or obscure deeper socio-environmental structures, such as globalised supply chain practices, regulatory incentives, or ecological feedback.

This metatheoretical stance informed our methodology by supporting an analytical examination of 'surface-level' sustainability claims. It enabled us to assess the extent to which ecolabel criteria align with known environmental pressures, and to identify where ecolabels reproduce partial, oversimplified truths that obscure systemic complexity. In this way, critical realism guides our assessment not only of *what* ecolabels measure, but of *how and why* those measurements may misrepresent underlying environmental realities.

Systems thinking and the TFI as a socio-ecological system

Complementing critical realism, systems thinking provides a conceptual lens for understanding the TFI as a complex, interdependent socio-ecological system. The environmental impacts associated with the sector do not arise from discrete components, but from dynamic interactions among actors, institutions, material flows, and infrastructures. Feedback loops, lock-in effects, and emergent properties shape both the scope of problems and the range of possible interventions (Ackoff, 1994; Meadows, 2008).

In operational terms, systems thinking informed our mapping of ecolabel influence points along the value chain. It helped identify where ecolabels might act as leverage points, for instance, by guiding procurement or influencing consumer perception, and where their influence is constrained by structural dynamics such as fragmented governance, power asymmetries, or linear business models. This lens also encouraged us to consider unintended consequences and to be attentive to trade-offs across environmental dimensions.

The DPSIR framework for evaluating ecolabel function

To support the structured assessment of ecolabel content and function, we drew on the DPSIR framework (EEA, 1999; Kristensen, 2004) as an analytical tool. DPSIR enables the decomposition of environmental problems into causal chains: *Drivers* (e.g. economic profitability), *Pressures* (e.g. emissions, water use), *State* (e.g. climate change), *Impact* (e.g. impacts on human life), and *Response* (e.g. policy, ecolabelling).

We used DPSIR to assess whether ecolabels adequately represent these different dimensions. Our findings suggest that most ecolabels focus narrowly on *Pressures* (e.g. water or chemical inputs), without tracking actual *State* changes or communicating *Impacts* in a way that supports effective *Response*. In practice, this means that consumers and stakeholders are not equipped with the information necessary to link ecolabelled actions with real environmental outcomes.

Furthermore, DPSIR was used as a dynamic framework supporting the understanding of evolving sustainability challenges. For example, we assessed whether ecolabel indicators reflect systemic issues such as climate feedback, regulatory change, or shifting social norms. This supported a context-sensitive evaluation of ecolabel design and its capacity to adapt to emerging ecological and policy realities.

Integration and Implications

Together, these theoretical orientations gave us a coherent analytical framework for evaluating ecolabel effectiveness. Critical realism enabled us to question the representational capability of ecolabel metrics. Systems thinking allowed us to trace their role within a complex business ecosystem. DPSIR offered a structured yet flexible framework to assess whether ecolabels reflect the causal aspects of environmental pressures.

This combination ensures that our report contributes a conceptually grounded and methodologically transparent assessment of ecolabels as governance instruments in the UK TFI. By applying this triadic framework, we aim to clarify both the epistemic limitations and the systemic possibilities for ecolabels to meaningfully contribute to environmental sustainability.

C. Supplementary Data Tables and Figures

Table A. Overview of 44 International and UK Ecolabels Used in the TFI (Reproduced from Kesidou and Palm 2024).

Under: Communication channel, B2C = Business-to-Consumer, B2B = Business-to-Business; Verifier ownership, N-P = non-profit, P = private, Publ. = public; Geographical scope, Int = International, Reg. EU = European Union, Nat. UK = United Kingdom; ISO Type "I" = ISO 14024 Type I; Source, EI = Ecolabel Index, FU = Fashion United, EGA = Ecolabel Guide App.

							Environmental attributes													
Ecolabel	Communication channels	Material area	Requirements to reduce GHG	Social & Environmental	Only mass recycled materials	Organic agriculture of fibres	Climate change	Biodiversity	Freshwater change	Chemical pollution	Altered P&N flows	Land system change	Verifier Ownership	Geographical scope	Value chain scope	ISO Type	1-2-3 party verification	Launch year	Source	Certifier website
ABNT Ecolabel	B2C	Component											N-P	Int.	Gate-to-gate	n.a	3rd	2007	EI	abnt.org.br
B Corporation	B2B	Process incl. component											N-P	Int.	Cradle-to-grave	n.a	3rd	2006	EI	bcorporation.net
Better Cotton Initiative	B2C	Component											N-P	Int.	Gate-to-gate	n.a	3rd	2009	EI	bettercotton.org
Blue Angel	B2C	Final product											N-P	Int.	Cradle-to-grave	I	3rd	1978	EI	blauer-engel.de
bluesign® standard	B2C	Final product											Priv.	Int.	Cradle-to-gate	n.a	3rd	2000	EI	bluesign.com
Carbon Neutral Certification	B2B	Process											Priv.	Int.	Cradle-to-grave	n.a	3rd	2002	EI	carbonneutral.com
Carbon Reduction Label	B2C	Final product											Publ.	Int.	Cradle-to-grave	n.a	3rd	2001	EI	carbontrust.com
CarbonFree® Certified	B2C	Process											Priv.	Int.	Cradle-to-grave	n.a	3rd	2009	EI	shop.climeco.com
Certified Wildlife Friendly®	B2C	Final product											N-P	Int.	Gate-to-gate	n.a	3rd	2007	EI	wildlifefriendly.org

Compostability Mark of European Bioplastics	B2C	Final product											N-P	Reg.EU	Cradle-to-grave	n.a	3rd	1993	EI	european-bioplastics.org
Cotton Made in Africa	B2C	Component											N-P	Int.	Gate-to-gate	n.a	3rd	2005	EI	cottonmadeinafrica.org
Cradle to Cradle Certified (CM) Products Program	B2C	Final product											N-P	Int.	Cradle-to-cradle	n.a	3rd	2005	EI	c2ccertified.org
EU Ecolabel	B2C	Final product											Publ.	Reg.EU	Cradle-to-grave	I	3rd	1992	EI	environment.ec.europa.eu
Fairtrade	B2C	Final product											N-P	Int.	Cradle-to-gate	n.a	3rd	1994	EI	fairtrade.net
Global Organic Textile Standard (GOTS)	B2C	Final product											N-P	Int.	Cradle-to-gate	n.a	3rd	2006	EI	globalstandard.org
Green Shape	B2C	Final product											Priv.	Int.	Cradle-to-grave	n.a	1st	2010	EI	csrreport.vaude.com
Green Tick - Sustainable	B2C	Final product											Priv.	Int.	Cradle-to-grave	n.a	3rd	1998	EI	greentick.com
GreenCircle - Carbon Footprint reduction	B2B	Process											Priv.	Int.	Gate-to-gate	n.a	3rd	2017	EI	greencirclecertified.com
GreenCircle - Dematerialization	B2B	Final product											Priv.	Int.	Cradle-to-grave	n.a	3rd	2014	EI	greencirclecertified.com
GreenCircle - Life Cycle Assessment Optimized	B2C	Final product											Priv.	Int.	Cradle-to-grave	n.a	3rd	2018	EI	greencirclecertified.com
GreenCircle - Product Optimization	B2C	Final product											Priv.	Int.	Cradle-to-grave	n.a	3rd	2013	EI	greencirclecertified.com
GreenCircle - Recycled content, Recycled material, Closed Loop Product	B2C	Final product											N-P	Int.	Cradle-to-gate	n.a	3rd	2009	EI	www.greencirclecertified.com
GreenCircle - Sustainable Energy Practices	B2B	Final product											Priv.	Int.	Cradle-to-grave	n.a	3rd	2017	EI	greencirclecertified.com
LowCO2 Certification	B2B	Process											N-P	Int.	Gate-to-gate	n.a	3rd	2005	EI	noco2.com.au
Made Safe	B2C	Component											N-P	Int.	Cradle-to-gate	n.a	3rd	2015	FU	madesafe.org
Naturland e.V.	B2C	Component											N-P	Int.	Cradle-to-gate	n.a	3rd	1982	EI	naturland.de

NoCO2 Certification	B2C	Final product											Priv.	Int.	Cradle-to-grave	n.a	3rd	2006	EI	noco2.com.au
Nordic Ecolabel or "Swan"	B2C	Final product											N-P	Int.	Cradle-to-grave	I	3rd	1989	EI	nordic-swan-ecolabel.org
Oeko-Tex Standard 101 - Made in Green	B2C	Final product											N-P	Int.	Cradle-to-gate	n.a	3rd	2014	EI	oeko-tex.com
Oeko-Tex Standard 102 - Standard 100	B2C	Final product											N-P	Int.	Cradle-to-gate	n.a	3rd	1992	EI	oeko-tex.com
Oeko-Tex Standard 103 - Organic Cotton	B2C	Component											N-P	Int.	Cradle-to-grave	n.a	3rd	2021	EI	www.oekotex.com
Oeko-Tex Standard 104 - STeP	B2B	Process											N-P	Int.	Gate-to-gate	n.a	3rd	2013	EI	oeko-tex.com
Oeko-Tex Standard 105 - Eco Passport	B2B	Component											N-P	Int.	Gate-to-gate	n.a	3rd	2005	EI	oeko-tex.com
Organic content Standard	B2B	Component											N-P	Int.	Cradle-to-gate	n.a	3rd	2013	EI	textileexchange.org
Organic Farmers & Growers Certification	B2C	Component											N-P	Nat.UK	Gate-to-grave	n.a	3rd	1973	EI	ofgorganic.org
Rainforest Alliance	B2C	Final product											N-P	Int.	Gate-to-gate	n.a	3rd	1987	ECA	rainforest-alliance.org
Recycled Claim Standard	B2C	Final product											Priv.	Int.	Gate-to-grave	n.a	3rd	2011	EI	scsglobalservices.com
Regenerative Organic Certified	B2C	Component											N-P	Int.	Gate-to-gate	n.a	3rd	2020	FU	regenorganic.org
Responsible Wool Standard	B2C	Component											Priv.	Int.	Cradle-to-gate	n.a	3rd	2016	EI	scsglobalservices.com
Sane Standard	B2C	Final product											N-P	Int.	Cradle-to-grave	n.a	3rd	2019	FU	sanestandard.com
SMaRT Consensus Sustainable Product Standards	B2C	Final product											N-P	Int.	Cradle-to-grave	n.a	3rd	2015	EI	mts.sustainableproducts.com
Soil Association Organic Standard	B2C	Component											N-P	Nat.UK	Gate-to-gate	n.a	3rd	1946	EI	soilassociation.org
World Fair Trade Organization (WFTO)	B2B	Process											N-P	Int.	Cradle-to-gate	n.a	3rd	1958	FU	wfto.com
ZQ Natural Fibre	B2C	Component											N-P	Int.	Gate-to-gate	n.a	3rd	2006	EI	discoverzq.com

B-H. Summarizing tables of ecolabels alignment with the analytical framework

Tables B-H summarises ecolabels used by top UK TFI in alignment with the analytical framework.

Table B. Global Organic Textile Standard (GOTS)

ASPECT	DETAILS
Scope and Characteristics	GOTS applies to the entire textile value chain, from fibre production to processing, manufacturing, packaging, and labelling. Requires textiles contain a minimum of 70% certified organic natural fibres. Uses a third-party certification system with clear chain of custody.
Environmental Metrics	Covers a wide range of environmental aspects, including prohibition of toxic chemical inputs, wastewater treatment, resource use efficiency, and biodiversity protection in organic agriculture. Promotes energy efficiency and environmentally preferable practices.
Stakeholder Meaningfulness	Recognised ecolabel among environmentally conscious consumers. Label includes a clear indication of organic content and the stage of certification. Offers clear criteria and high transparency for businesses and regulators.
Scientific Reliability	Methodologically rigorous, relying on internationally recognised organic farming criteria and strict chemical management in processing. Certification involves regular third-party audits and compliance verification.
Alignment with Environmental Pressures	Addresses several key environmental concerns in the TFI, including chemical pollution, land use impacts, and biodiversity loss. Contributes to lower-impact production and reduces pressures from hazardous inputs.

Table C. Oeko-Tex Standard 100

ASPECT	DETAILS
Scope and Characteristics	Oeko-Tex Standard 100 is a product-level certification for textiles and garments. It does not address raw material production or organisational practices. Ensures textiles are tested for harmful substances. Verification by third-party laboratories, certification for specific product classes.
Environmental Metrics	Focus on chemical inputs that pose health risks. Does not address broader environmental issues like GHG emissions, biodiversity, or water use. No formal metric for circularity or life cycle assessment.
Stakeholder Meaningfulness	High brand recognition, especially in Europe. Assures products are free from hazardous substances. Valued for clarity and technical rigour by regulators and value chain actors.
Scientific Reliability	Based on comprehensive toxicological and chemical testing protocols. Uses standardised laboratory methods. Criteria are publicly available and updated regularly based on latest scientific knowledge.
Alignment with Environmental Pressures	Relevant to consumer safety and reducing chemical risks. Does not address water scarcity, GHG emissions, or resource depletion. Limited alignment with environmental priorities in the TFI to toxicological impacts in post-fibre stages.

Table D. Organic Content Standard

ASPECT	DETAILS
Scope and Characteristics	Tracks presence and amount of certified organic material in a final product, covering fibre and processing stages. Applies to both components and final products, follows a chain of custody model with third-party verification.
Environmental Metrics	Not a performance standard but a traceability standard. Verifies organic content but does not evaluate or report environmental impacts like GHG emissions, water use, or chemical avoidance. Minimal environmental metric coverage.
Stakeholder Meaningfulness	Meaningful to businesses and regulators for value chain traceability. Provides limited information on overall product sustainability for consumers, may be confused with broader certifications like GOTS.
Scientific Reliability	Strength lies in documented chain of custody system and clear material verification processes. Reliable for determining organic input presence, lacks frameworks for measuring environmental outcomes.
Alignment with Environmental Pressures	Does not measure or require environmental performance beyond confirming organic origin. Indirectly aligns by encouraging organic agriculture, generally associated with lower pesticide use and enhanced soil health.

Table E. Global Recycled Claim Standard

ASPECT	DETAILS
Scope and Characteristics	The GRS is a product-level standard that verifies the recycled content of materials and evaluates environmental and social criteria in processing stages. It applies to a range of products and components and includes chain of custody verification via third-party audits.
Environmental Metrics	GRS addresses resource efficiency, chemical management, and waste reduction. It partially covers GHG emissions through requirements for environmentally sound processing but does not offer quantitative emissions data. Circularity is central to its scope, given its focus on recycled input and process integrity.
Stakeholder Meaningfulness	GRS is increasingly recognised by brands and consumers interested in circular economy principles. It provides a credible signal of material recycling and responsible processing, though its level of public familiarity varies by region.
Scientific Reliability	The standard is grounded in transparent, third-party audit requirements, and draws from established environmental protocols. While it does not include full life cycle assessments, its verification of recycled content and environmental procedures is scientifically credible and auditable.
Alignment with Environmental Pressures	GRS is highly aligned with pressures related to resource depletion, waste, and chemical use. It offers a partial contribution to reducing GHG emissions and enhancing circularity, making it relevant to multiple environmental challenges in the TFI.

Table F. Better Cotton

Aspect	Details
Scope and Characteristics	Focuses on farm-level practices, applicable to cotton fibre, not processing or final products. Uses mass balance chain of custody. Verification by third-party organisations.
Environmental Metrics	Addresses water use, pesticide reduction, soil health, biodiversity. No quantitative metrics on GHG emissions, circularity not addressed.
Stakeholder Meaningfulness	Recognised by industry stakeholders and brands. Limited consumer-facing clarity, non-traceable mass balance model, absence of item-level labelling.
Scientific Reliability	Informed by agronomic research and stakeholder consultation. No quantifiable or standardised impact data. Verification focuses on practice compliance.
Alignment with Environmental Pressures	Addresses pesticide use, water management. Does not account for value chain GHG emissions, textile processing impacts, or waste.

Table G. Recycled Claim Standard

ASPECT	DETAILS
Scope and Characteristics	The RCS is a traceability standard that certifies the presence and proportion of recycled material in a product. It applies to both components and finished products and requires third-party verification of chain of custody. Unlike GRS, it does not include environmental or social criteria for processing.
Environmental Metrics	RCS confirms recycled content but does not address any other environmental metrics such as GHG emissions, chemical use, or biodiversity. It is focused exclusively on material input tracking.
Stakeholder Meaningfulness	The RCS label can be meaningful in B2B contexts where value chain verification of recycled input is necessary. Its meaning to general consumers is limited, and the absence of processing standards can be confusing when compared to more comprehensive ecolabels.
Scientific Reliability	Its documentation and chain of custody system are robust and follow international norms for material traceability. However, the lack of environmental performance criteria limits its value for scientific assessments of product sustainability.
Alignment with Environmental Pressures	RCS supports circular material use by verifying recycled content, but it does not address processing emissions, chemical impacts, or water use. Its alignment is confined to material recovery and waste minimisation.

Table H. Responsible Wool Standard

ASPECT	DETAILS
Scope and Characteristics	RWS applies to wool production, covering both animal welfare and land management practices. Includes farm-level requirements and traceability through the value chain. Certification is third-party verified, applicable at component and final product levels.
Environmental Metrics	Includes criteria on soil health, biodiversity, and land use, especially regarding grazing practices. Does not quantify GHG emissions, water use, or chemical inputs beyond basic restrictions. Contributes to better pasture management and sustainable farming systems.
Stakeholder Meaningfulness	Among sustainability-conscious brands and value chain actors, RWS is regarded as a credible animal welfare and land stewardship standard. Consumer recognition is limited, and the ecolabel's environmental implications are not always apparent without supporting communication.
Scientific Reliability	The standard uses best practices in sustainable grazing and animal welfare, verified by accredited third parties. Criteria are transparent, and management practices are evidence-informed.
Alignment with Environmental Pressures	RWS aligns well with land degradation, soil health, and biodiversity concerns in wool-producing regions. Provides limited coverage of GHG emissions and energy or water use in processing, thus offering partial alignment with broader TFI environmental pressures.

Box A. Business targets that can contribute to resilient system-change goals.

This text box excerpt is reproduced from Cornell et al. (2021, p. 4) introducing a framework for aligning TFI business action with planetary priorities to mitigate pressures on Earth system processes.

By setting action targets on the planetary priorities now, individual businesses can ensure their circular economy efforts reduce pressures by 2030 and contribute to the system-wide change across the industry that is needed to meet global goals for the longer term.

Decrease CO_2 emissions by 8% or more per year from 2020, aiming for carbon neutrality by 2050. This ambitious decarbonization target is vital for reaching net-zero emissions. Science-Based Targets specify how a brand's activities contribute to rapid emissions reductions. Coalitions like EP100 and RE100 enable best-practice sharing and industry-wide learning for transformational action in energy systems.

Ensure no net loss of land and marine habitats, aiming for 30% of the world under conservation protection. Brands need to ramp up ecosystem restoration and conservation efforts fast, halting and reversing the long-term decline of biodiversity losses, while safeguarding human rights. New Science-Based Targets for nature enable brands to assess their own impact on nature and also to contribute together to achieving global biodiversity goals.

Halt deforestation and triple the contribution of climate-smart agriculture to material production, aiming to restore 20% of the world's land area to a well-functioning, climate-stabilizing, ecologically resilient state. Efficient and resilient agriculture systems, zero deforestation and more reforestation are all needed if global land-use systems are to support the world's needs for bioresources, food and water and meet net-zero climate and net-positive biodiversity goals. The Bonn Challenge mobilizes global efforts for landscape restoration.

Reduce freshwater abstraction and consumptive use by 30%, aiming to maintain total freshwater withdrawals below 40% of renewable supplies in all watersheds. This target reduces direct water security risks to brands and recognises the shared nature of water. Given the vital role of water for all life, stronger methodologies are currently being developed for contextual sustainability metrics that help protect the environmental water flows that sustain resilient landscapes. Brands should be responsive to these developments and monitor the 'water footprints' of their products.