

*Roadmap towards
responsible viscose
& modal fibre
manufacturing*

Roadmap

Towards responsible
Viscose and modal fibre
Manufacturing

1. Purpose and scope of this document

The purpose of this document is to provide guidance to brands and retailers¹ that have engaged with the Changing Markets Foundation following the publication of *Dirty fashion: How pollution in the global textile supply chain is making viscose toxic* (Changing Markets Foundation, 2017). It achieves this by defining some key principles and guidelines for cleaning up the manufacturing of viscose and modal fibres.

There are various types of manmade cellulose fibres on the market including viscose, modal and lyocell, all of which use different approaches to 'regenerate' cellulose. Viscose is the dominant production method, representing more than 70% of the global viscose market; modal and lyocell represent 19% and 9% respectively. The manufacturing of modal is similar to viscose production, as it can be produced on the same asset, although it can be more chemical- and energy-intensive. Therefore, when we refer to viscose in this document, this includes modal fibres and the same standards apply.

Viscose can be produced in a responsible way, but unfortunately many manufacturers have not yet adopted best practices on management of toxic and corrosive chemicals,² making the processing of dissolving pulp into fibre and yarn highly polluting. Without proper treatment, the discharge of pollutants into the air and chemicals into waterways can affect the delicate natural balance of ecosystems and water bodies, and harm the health of factory workers and local communities.

Responsible viscose production requires brands to become the drivers of transformation by pushing their suppliers to reach ambitious environmental and social targets that go beyond the existing regulatory framework. An ambitious, industry-led approach can lay the foundations for stronger regulation of the sector, which will in turn help provide a level playing field for viscose manufacturers in the future. Through the steps set out in this roadmap, committed brands need to set hard deadlines for improvement and transition to closed-loop production by 2023-25, and be transparent about their progress towards this goal.

This roadmap focuses on improving viscose fibre³ production facilities and leveraging brands' ability to engage manufacturers in order to tackle issues within this specific part of the supply chain. If they want to be regarded as delivering responsible products, brands must apply a holistic approach throughout the entire supply chain by taking this roadmap into consideration, alongside other ongoing efforts at other stages of the supply chain.

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- 1 Hereafter referred to as 'brands'.
 - 2 Including carbon disulphide (CS₂) (a hazardous and endocrine-disrupting chemical), hydrogen sulphide (H₂S), sodium hydroxide (NaOH) and sulphuric acid (H₂SO₄).
 - 3 Viscose fibre exists as viscose filament yarn and viscose staple fibre. Viscose filament yarn is a spun thread ready for weaving into textiles, while staple fibres are cut into short pieces after the spinning bath and can be blended with other fibres into textile yarns or processed into 'non-woven' products later on.



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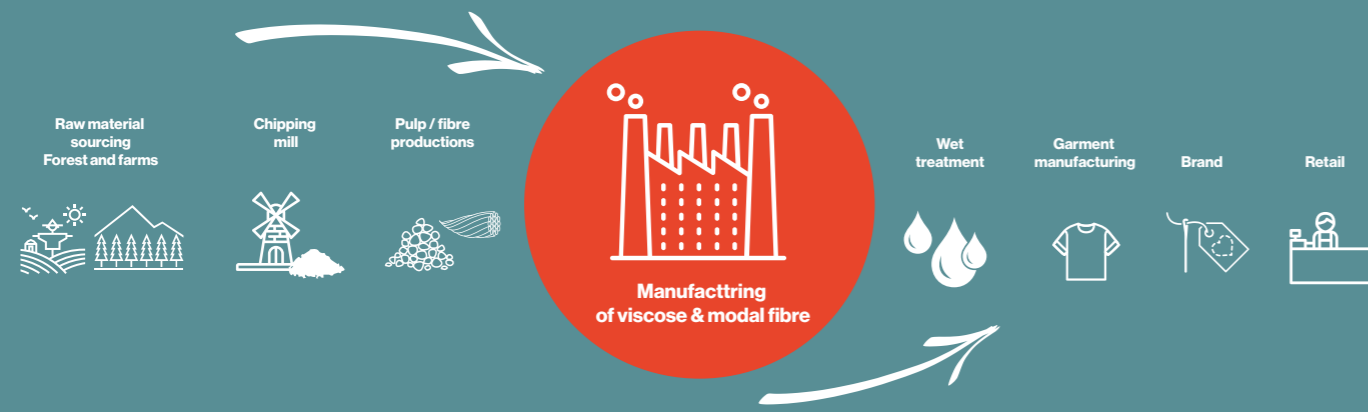
Prepared by the Changing Markets Foundation
in collaboration with The Forest Trust
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This document does **not** cover:

- sustainability issues around the sourcing⁴ and production of dissolving wood pulp, if this is done at a different location to fibre production;
- chemicals used in wet processing;⁵
- social issues and labour rights, to the extent that these are not specific to viscose manufacturing (we consider that brands should already be engaging on these issues via other initiatives, and that these efforts should cover their entire supply chain);
- lyocell manufacturing, which is a different process and widely considered more sustainable than viscose and modal production.⁶



2. Why is it important and timely for brands to move towards responsible viscose and modal manufacturing?

- Demand for viscose is expected to increase by around 5% per year to 2021 (Textile World, 2015), which will entail investment in additional manufacturing capacity. In 2030, viscose/cellulosic fibres are projected to account for 8.5% of the fibre market (Global Fashion Agenda & The Boston Consulting Group, 2017). This represents a key opportunity for brands to demand better standards for new factories.
- The viscose market is currently highly concentrated; ten companies supply approximately 75% of the market (Canopy, 2017).
- Governments and consumers are becoming more demanding when it comes to sustainable manufacturing and environmentally-friendly products. For example, the Chinese government is becoming more serious about pollution issues and closing down the country's worst-polluting factories. This represents a concrete business risk for companies using irresponsible suppliers that flout environmental rules.⁷

⁴ This is covered by the CanopyStyle initiative.

⁵ This is covered by Greenpeace Detox and Zero Discharge of Hazardous Chemicals (ZDHC) commitments.

⁶ The lyocell process works in a 'closed loop', meaning that water and chemicals in the process are reused, and therefore appears promising in terms of reducing the environmental impacts of manmade cellulose production. It also substitutes the harmful chemical carbon disulphide (CS₂) with a less harmful organic solvent. While many brands have decided to switch to lyocell as a more sustainable alternative to viscose, our research indicates that it is unlikely that lyocell will replace viscose and modal altogether, as each fibre possesses different properties that make them appropriate for different uses.

⁷ According to a September 2017 article in the *South China Morning Post* (Cai, 2017):

- Viscose manufacturing can be clean. Better production methods exist in which viscose is produced in a closed-loop system, which limits pollution. Combined with the biodegradable nature of viscose and modal, this means that these fibres could become sustainable. This document highlights the measures brands can take to drive positive transformation of the viscose industry.

3. General requirements for responsible brands/retailers

This section describes general prerequisites (not limited to viscose manufacturing) for responsible brand behaviour. Without responsible production policies, a thorough understanding of their own supply chains or robust policies on transparency, brands will not be able to adequately tackle viscose pollution. Brands should:

- I. *Establish a responsible production policy, either as part of a general Responsible Sourcing Policy or as a standalone document, including specific requirements for viscose suppliers, as set out in section 4.*

Any responsible production policy (not limited to viscose) should ensure:

- compliance with laws and workplace regulations;
- recognition, respect for and upholding of human rights and the rights of communities;
- raw materials are sourced from plantations, forests or farms that are responsibly managed;
- consideration for biodiversity;
- waste is prevented, reused, recycled, recovered and/or disposed of in an environmentally sustainable way;
- greenhouse gas emissions are reduced;
- air emissions from processing plants are reduced, with appropriate air pollution control systems in place;
- impacts on water are mitigated by implementing water management plans and additional measures in water-stressed areas, including:
 - establishment of impact assessments, including water resource assessments;
 - minimisation of water withdrawal from the environment;
 - prevention of water pollution, in particular the cessation of release of any priority hazardous substances (zero liquid discharge);
 - deployment of dedicated wastewater treatment systems appropriate to the volume of wastewater produced, so that chemicals used in the production of viscose are discharged in compliance with best practice (see section 4);
- implementation of precautionary measures to reduce/eliminate release of toxic chemicals, including accident-prevention measures and regular surveillance;
- development of a plan for zero discharge of hazardous waste through leaks, spills, regular operations, uncontrolled discharges etc.;
- transparent communication on environmental track record, e.g. making monitoring data available online.

The scale of China's campaign to fight pollution is unprecedented. Since last summer, an army of 5,600 inspectors, from both the environment ministry, and the Communist Party's anti-corruption watchdog and personnel units, has scoured the country rooting out officials who had failed to uphold the law on environmental protection and punishing companies - about 18,000 at the latest count - that failed to observe it.

II. Map their supply chain and provide full transparency on the identity of suppliers, as well as potential environmental and social issues and how these are being addressed.

The supply chain should be comprehensively mapped to identify all the companies that brands are buying from.⁸ Acknowledging the public's right to know regarding all environmental aspects across their operations, brands should be transparent about who their suppliers are and how potential issues in their supply chain are being addressed. This information should be communicated publicly through publication of a supplier list,⁹ including viscose factories, which should be updated periodically.¹⁰ Suppliers should also be transparent and publicly disclose information about the hazardous chemicals used and discharged in the production process, and about their own commitments to sustainability. As proof of improvement (or otherwise), brands should publish progress reports - including audited performance and testing data showing releases and discharges - on their corporate website or public database.

III. Evaluate and assess factories throughout their supply chain to assess their alignment with criteria for responsible production (including those producing viscose and modal fibres, in line with requirements in section 4).

Once the supply chain has been mapped and a responsible production policy established and communicated, brands can engage with their suppliers on the implementation and delivery of the commitments. Long-term working relationships with suppliers are key, as these build trust and establish common understanding of expectations. While setting ambitious goals and milestones is important, transformation is a continuous journey, and an approach that is most effective involves:

- removing the worst practices and the suppliers that refuse to improve;
- promoting the best practices and suppliers;
- improving the rest with milestones and timelines;
- holding companies to account, with actions and outcomes being key to long-term buying partnerships.

This can be done via a **gap analysis**, which aims to identify non-compliance in order to support the development and implementation of participative corrective action plans, with the goal of continuous improvement. There are several ways these action plans can be developed, but experience shows that clear indicators have to be established to address the issues step by step. Starting with the most critical issues first, brands should ensure the implementation of an action plan that is both relevant and adapted to the context, and ask for regular updates and transparency on progress.

IV. Regularly verify and monitor their production facilities.

The purpose of monitoring and verification is to regularly assess how policies are being implemented and how gaps are being addressed. Third-party due diligence is important to establish long-term, legitimate business relationships between brands and suppliers.

Brands should ensure a process to monitor and verify their suppliers that is:

- **Independent**, through third-party monitoring and verification. This can take place through a participative approach; for example, via an independent mechanism, which pools financial contributions from companies

8 Although brands are moving towards heightened transparency, most do not publish information on suppliers beyond tier 1. However, as part of the CanopyStyle initiative, many brands have communicated to us that they have already mapped their viscose supply chain as part of an internal exercise.

9 At a minimum, this should include company name, address and operations.

10 It is important that traceability is established as a means to an end, not the end goal itself. The intelligence gained is necessary to identify issues and collaborate on solutions; but without action behind it, traceability is not transformative. Brands and other downstream companies should publish their traceability information, but should not rely on this disclosure as sufficient to demonstrate action towards their commitments. This information should be used to identify priority areas or suppliers to engage in the next phase of work: transformation.

under specific monitoring programmes and makes financing available to independent and qualified local organisations to monitor the companies.¹¹

- **Regular** (e.g. monthly), so that it provides periodic review to brands on how suppliers' practices align with commitments.
- **Transparent** about how brands are fixing the problems and how suppliers are addressing and mitigating the identified risks. This includes online data on suppliers' environmental performance (e.g. real-time continuous monitoring data for air and water pollutants' release and actions taken to continuously improve environmental and health protection). Suppliers should annually publish Sustainability reports according to internationally recognised standards (e.g. the Global Reporting Initiative, ISO 26000, and the UN Global Compact on social responsibility). These reports should be independently audited.
- **Participative**, i.e. based on an approach that considers risk within the context of the supply chain and the manufacturing site, and allows for ownership of transformation by the supplier.
- **Committed to addressing non-compliance**, by brands committing to notify competent authorities about breaches and taking an active approach to restoring compliance within the supply chain.

Several brands are using the Higg Index Facility Environmental Module (FEM 3.0 module), which is currently not appropriate for the purposes of this roadmap, because (1.) some elements in the roadmap are missing in the FEM 3.0¹² and would have to be properly addressed through other policies and procedures, and (2.) monitoring and verification should be more frequent than annually and producers' performance and progress should be transparently and regularly reported for all the companies in the supply chain.

V. Establish appropriate grievance and remediation procedures.

Brands should also encourage their suppliers to establish appropriate grievance procedures that allow stakeholders to report concerns without fear of recrimination or dismissal. Such protocols should include redress for workers, impacted individuals or communities. They should respond rapidly and effectively to issues raised, and address them as transparently as possible. Remediation should be undertaken in consultation with affected communities; it could include (for example) corrective actions on pollution prevention/control measures, drinking water, waste removal etc. to improve the lives of affected people.

4. The Roadmap: towards responsible viscose manufacturing

This section sets out key principles for brands to include in their responsible sourcing policies and communicate to their suppliers, as set out in section 3.

The main objective of the roadmap is for viscose and modal producers to move towards a closed-loop manufacturing system.

In this roadmap, "closed-loop system" is defined as a system that ensures emission controls and chemical recovery rates in line with the EU Best Available Technique (BAT) standards (see section 4.B). This system aims to recycle the majority of chemicals used during production and prevent the production process from negatively impacting on human health and the environment.

While we acknowledge that implementing closed-loop production at existing viscose manufacturing plants will

11 For example, this process could be streamlined through the Higg Index, if the Higg Facility Environmental Module (FEM 3.0 module) included all the elements highlighted in this roadmap.

12 This includes; regard for social issues (e.g. living wage, freedom of association is respected); ensuring that inhabitants of areas surrounding viscose factories are not exposed to dangerous chemicals; that corrective actions are taken to ensure damage in the surrounding environment is remediated; that appropriate grievance mechanism is in place; ensuring waste treatment facilities operate whenever production is taking place, not on an intermittent or discretionary basis; and any other points from Chapter 4 of this document, missing in FEM 3.0.

VISCOSE PRODUCTION PROCESS

1 THE STARTING MATERIAL FOR THE PRODUCTION OF VISCOSE IS CELLULOSE, OBTAINED FROM:



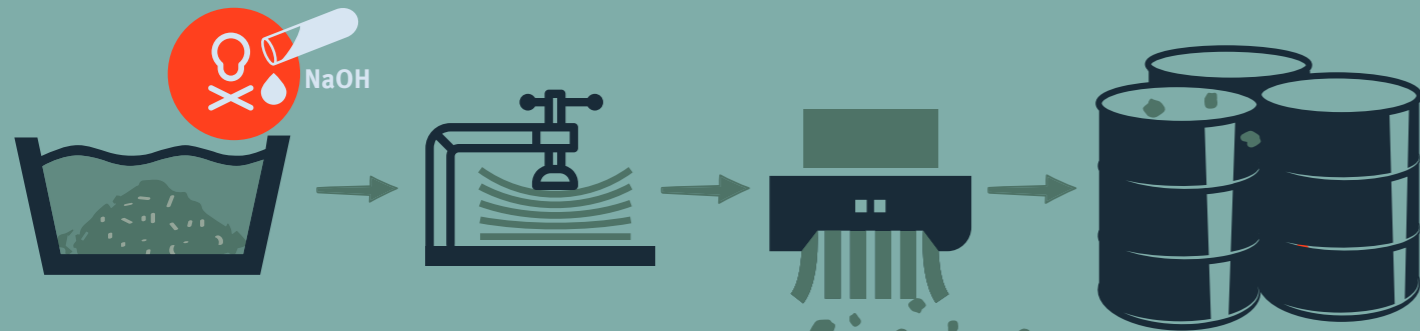
2 CELLULOSE OR WOOD PULP IS EXTRACTED

3 VISCOSE PRODUCTION: VISCOSE IS PRODUCED BY PROCESSING PURIFIED CELLULOSE

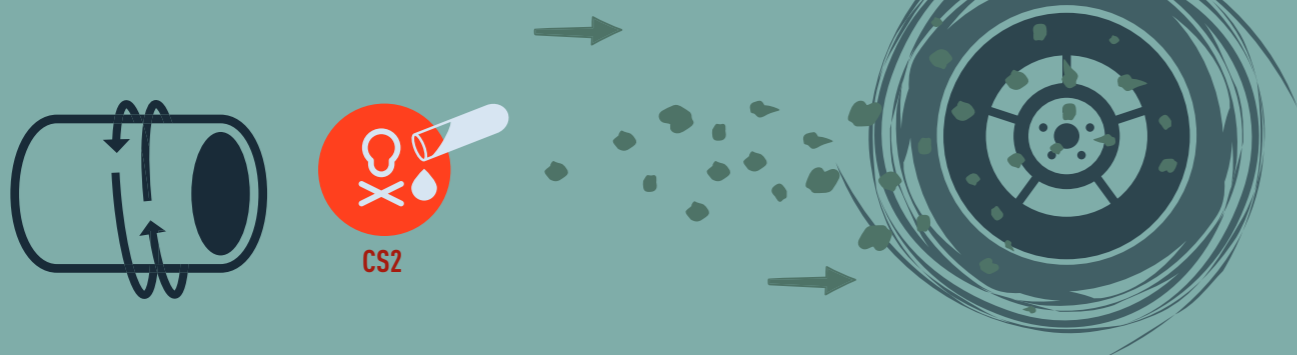
A. CELLULOSE IS TREATED WITH SODIUM HYDROXIDE / CAUSTIC SODA (NaOH) to extract and purify the cellulose and form sheets of alkali cellulose.

B. PRESSING, SHREDDING
Turns sheets into cellulose crumbs

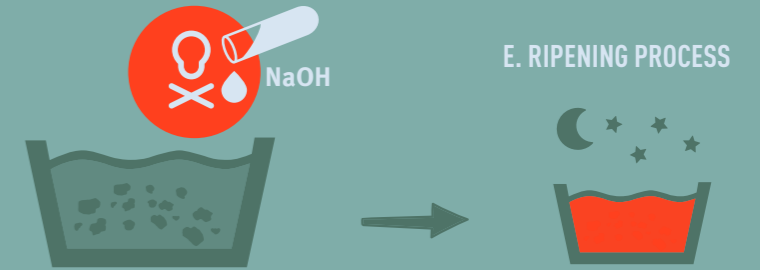
C. AGEING
These crumbs are aged in metal containers for a couple of days



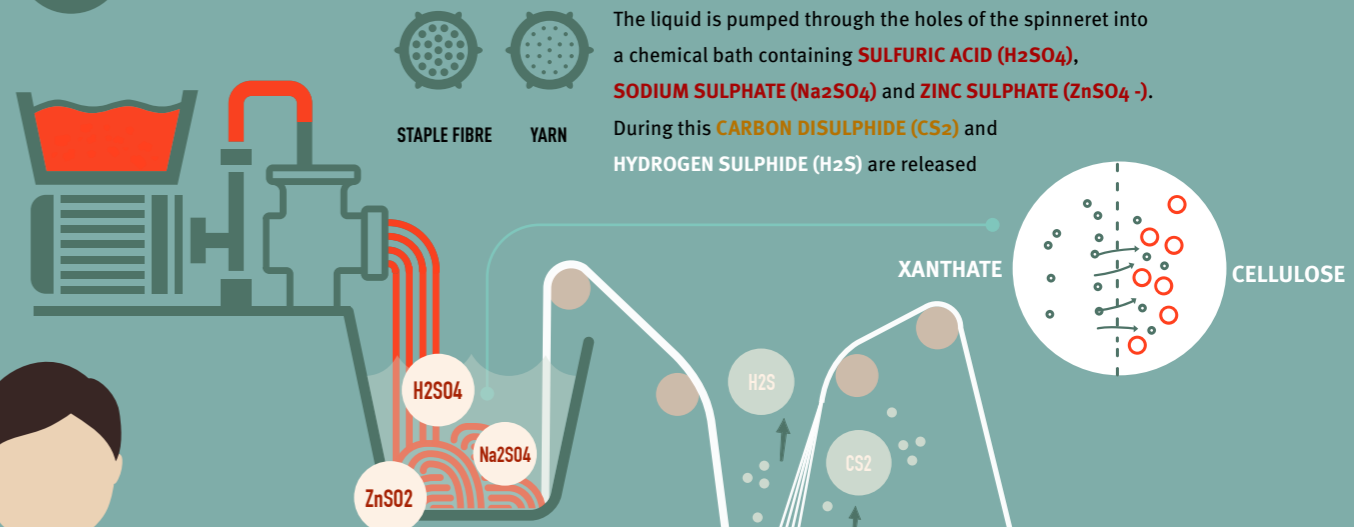
D. XANTHATION:
Cellulose crumbs are placed in air-tight rotating drums and **CARBON DISULPHIDE (CS₂)** is added to transform the purified cellulose into cellulose xanthate, which looks like a yellow crumb.



E. DISSOLVING:
Crumbs are again dissolved in a weak solution of **CAUSTIC SODA (NaOH)** to form a highly viscous liquid - viscose - which looks like honey



4 WET SPINNING TO PRODUCE VISCOSE RAYON

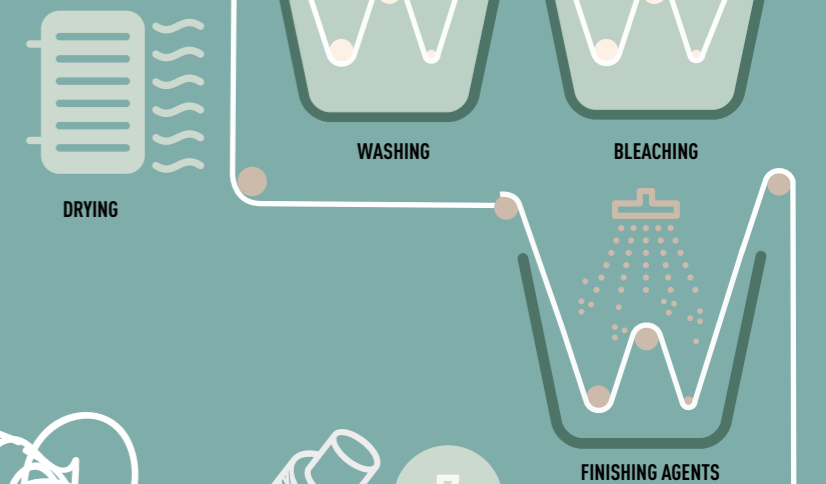


5 DRAWING TO MAKE FIBRES STRONGER

After extrusion from the spinneret, the viscose rayon fibres are still very fragile. To make them stronger, they are drawn and stretched

6 AFTER TREATMENT TO PRODUCE FINAL VISCOSE FIBRE

desulphurising, bleaching, washing, drying, and application of finishing agents



8

7

VISCOSE STAPLE FIBRE/FILAMENT YARN READY FOR USE



Closed-loop manufacturing of cellulose fibres: key characteristics based on a review of existing standards and regulations

- Key chemicals recycled through a closed-loop system include:
 - Carbon disulphide (CS₂), which needs to be contained and recovered;
 - Hydrogen sulphide (H₂S), recovered as sulphuric acid (H₂SO₄);
 - Zinc sulphate (ZnSO₄), recovered from waste water as zinc sulphide (ZnS) and then recycled as zinc sulphate (ZnSO₄).
- BAT is **to condense the exhaust air from spinning streets** to recover CS₂ and recycle it back into the process (EU BAT) (European Commission, 2007).
- BAT is **to recover CS₂ from exhaust air streams** through adsorption on activated carbon (EU BAT).
- BAT is to **apply exhaust air desulphurisation processes** based on catalytic oxidation with H₂SO₄ production (EU BAT).
- BAT is **to recover sulphate from spinning baths** (EU BAT).

not happen immediately, it should be standard for any new capacity being introduced and an end goal for existing facilities, which must move towards closed-loop production within a three- to five-year timeframe.¹³ Brands should acknowledge that facilities will have different starting points, and initially encourage high-volume producers to be first movers, but should support transformation of all facilities over time.

Based on our investigations to date, the **key environmental and social issues related to viscose manufacturing are: air pollution; water pollution; disposal of solid waste or viscose rejects; energy source, energy consumption and workers' health and safety**. All these factors affect the quality of life, livelihoods and health of people working at the sites and living in the areas surrounding viscose plants, and take a significant toll on local ecosystems.

As such, brands should include the following steps in their responsible sourcing policies to minimise the adverse impacts of viscose manufacturing.

A. Brands should ensure that their suppliers have all requisite environmental permits and comply with relevant national and local regulations.

Brands must proactively communicate to manufacturers that operating legally - with all relevant permits, and in compliance with national and local legislation - is a key expectation, and crucial to maintaining an ongoing commercial relationship. Not doing so will increasingly represent a serious business risk, as demonstrated by the Chinese government's recent increase in inspections of manufacturing sites in China, which has resulted in the fining and/or closure of thousands of the country's most polluting factories.

Brands should ask their suppliers to demonstrate that they possess the required environmental permits and proof of compliance with local laws and regulations. One way to check compliance in China is by using the Blue Map Database, maintained by China's Institute of Public & Environmental Affairs (IPE, n.d.)¹⁴, which includes viscose factories. Through the database, brands can check in real time whether factories are complying with Chinese regulations, and how often they have breached national pollution standards. The platform also offers an opportunity to request that companies take corrective action, and an option for factories to report on voluntary commitments - such as disclosure of pollutant release and transfer (PRTR) emissions data, Greenpeace Detox commitments, etc.¹⁵

Brands should request that suppliers rapidly address all omissions, and demand corrective action for any breaches. If

13 Intermediate steps include application for a factory upgrade permit, approval of an upgrade plan by a relevant authority or similar documents. These documents could be provided as proof of good intentions to brands.

14 no date

15 In the IPE database (IPE, 2010), companies can find the following information about factories in China and submit feedback:
1. Supervision records: Official environmental supervision records collected from government and other official sources;
2. Online data: Real-time data for air emissions (hourly) and wastewater (bi-hourly), required to be reported via provincial-level government platforms;
3. Enterprise feedback: Enterprise-submitted explanations about violation records and corrective actions, as well as Green Choice Alliance (GCA) audit reports;
4. Emissions data: Self-reported data from enterprises, consisting of three types: PRTR, detox data (Greenpeace) and 'other' (generally enterprise-reported data published on government platforms).

corrective action is not taken by a specified deadline and the factory does not undertake significant efforts to address and remediate environmental damage, the brand should clearly indicate that they will stop buying from this factory.

B. Producers should introduce plans for appropriate chemical management systems, including waste water treatment and measures to prevent/reduce emissions to air, with the ultimate goal of moving towards closed-loop production.

Correct management of chemicals and prevention of discharges to the environment are key components of responsible viscose manufacturing. The brand should ask producers to regularly monitor air quality, minimise air pollution and manage wastewater through a waste management plan. Such a plan should include measures to reduce water use, wastewater generation, enhance the reuse of water during industrial processes and ensure the wastewater treatment system is efficient in recovering water quality at the required levels. Brands should request that suppliers demonstrate appropriate chemical management system through third party verification that examines suppliers' management records, a full inventory of chemical inputs, a mass balance of the process identifying all losses and documentation of chemical releases (to air, water and in the form of solid waste). It should also be made clear to manufacturers that waste treatment facilities should operate whenever production is taking place, not on an intermittent or discretionary basis. Brands should also encourage their suppliers to continuously improve their operations, with the aim of achieving closed-loop manufacturing by 2023-25.

When developing this roadmap, Changing Markets reviewed numerous standards and labels that address emissions from viscose manufacturing. We concluded that currently, there is no single standard that addresses all the parameters relevant to viscose fibre production. The most comprehensive standard, however, is contained in the European Commission's (2007) *Reference document on best available techniques (BAT) in the production of polymers*. This could provide the reference point for a global standard applicable to all companies manufacturing viscose fibre and filament. The standard includes relevant chemicals that are usually discharged from the viscose manufacturing process and sets limits on them in the form of ranges.¹⁶ It was set over ten years ago, when the lower range was already achievable in Europe. In addition, our discussion with NGOs indicates that the performance levels in the upper range do not reflect the state-of-the-art performance that is technically achievable today. Given the technological advances over the last decade, suppliers should comply with the lower end of the ranges set out in the BAT reference standard, especially for new capacity coming on market.

In addition to the parameters in Table 1, brands should call on their suppliers to apply the processes defined in the BAT (section 13.10) with regard to managing air pollution,¹⁷ water pollution¹⁸ and treatment of solid non-hazardous waste.¹⁹

	Standard	Air pollution	Water pollution			Energy	Solid waste
Viscose staple fibre	EU BAT	Sulphur to air (kg/t) expressed as an annual average	Zinc to water (g/kg)	COD (g/t)	Sulphate (kg of SO ₄ ²⁻ /tonne)	Direct energy (GJ/t)	Hazardous waste (kg/t)
		12-20	0.01-0.05	3,000-5,000	200-300	20-30	0.2-2.0

Table 1: EU BAT emissions standards for viscose staple fibre production

Source: European Commission (2007)

16 Standards usually measure just the final sulphure emissions to air and water. However, without proper chemical management, plants could still emit toxic chemicals CS₂ and H₂S. Manufacturers have to put in place good management systems and technologies to prevent this, for example they can operate Carbon Disulphide Adsorption (CAP) or Wet Sulphuric Acid (WSA) Units.

17 The BAT is to operate spinning frames in houses to minimise the CS₂ emissions from spinning.

18 BAT is to reduce Zn from the waste water by alkaline precipitation followed by sulphide precipitation. BAT is to achieve 1.5mg/l of Zn. For sensitive waterbodies, BAT is to achieve 0.3mg/l of Zn. Second, BAT is to use anaerobic sulphate reduction techniques for sensitive waterbodies. If further sulphate elimination is necessary, anaerobic reduction to H₂S is carried out.

19 BAT is to use fluidised bed incinerators to burn non-hazardous wastes and recover the heat for the production of steam or energy.

The pitfall of the EU BAT is that it only addresses emissions limits for viscose staple fibre – not viscose filament yarn.²⁰ Some labels (see Table 2) set limits for emissions to water and air for filament yarn; for example, The Blue Angel (n.d.) (Germany), Bra Miljöval (Sweden) (SSNC, 2015) and Nordic Swan (Nordic Ecolabelling, n.d.). Brands should require that suppliers refer to these standards and adopt the most ambitious limits for each pollutant addressed by these labels.

	Standard	Air pollution	Water pollution			
		S to air (kg/t) expressed as an annual average	Zinc to water (g/kg)	COD (g/t)	pH	Sulphide (mg/l)
Viscose filament yarn	EU Ecolabel	40 (batch washing) 170 (integrated washing)				
	The Blue Angel	60	0.3	20,000		0.3
	Nordic Swan	25	0.3			
	Bra Miljöval	120	0.2		6–9	

Table 2: Emissions standards for viscose filament yarn production

Sources: The Blue Angel (n.d.), Nordic Swan (Nordic Ecolabelling, n.d.), Bra Miljöval (SSNC, 2015)

Currently, no labelling scheme addresses all relevant chemicals used in the production of viscose staple fibre or filament yarn. EU Ecolabel, which at the moment only addresses air emission limits in viscose fibre production, could be updated to cover all of the relevant parameters through pollution limits.²¹

To add to information sharing and incentivise innovation, brands should publish their case studies on better chemical management by their suppliers on public platforms. This should include case studies on substitutions of hazardous chemicals in the process, with the purpose of triggering investments in safer and more sustainable chemistry and research on substitutes. Brands should request that, in the long run, chemicals with intrinsic hazardous properties be substituted – either through non-chemical (process switch) or better chemical alternatives.

C. Measures should be in place to protect workers and local inhabitants from exposure to dangerous chemicals

Workers should wear protective gear at all times, and companies should ensure they are properly trained on health and safety procedures. Adequate air treatment measures should be in place, which guarantee that workers avoid exposure during production cycles. In addition, producers should ensure that inhabitants of areas surrounding viscose factories are not exposed to dangerous chemicals by engaging in activities such as washing raw or semi-processed viscose where traces of chemicals are still present. Proper waste management practices should be used with appropriately qualified companies for (hazardous) waste disposal. Brands should also ensure that other social issues are well addressed: that workers are being paid a living wage, that their freedom of association is respected, etc.²²

²⁰ Our research indicates that viscose filament yarn represents a much smaller share of the market.

²¹ The benefit of using the Ecolabel standard could be the fact that it also covers pulp sourcing and wet processing in the sustainability assessment and has well-defined award criteria and established procedures for verification of compliance, within and outside of the EU, which could make implementation more straightforward.

²² With regard to this, brands should implement the due diligence recommendations in the OECD Guidelines for Multinational Enterprises, the UN Guiding Principles on Business and Human Rights and other relevant responsible business conduct standards – such as the Universal Declaration of Human Rights, the International Labour Organization’s (ILO) Declaration on Fundamental Principles and Rights at Work, relevant ILO Conventions and Recommendations and the ILO Tripartite Declaration of Principles Concerning Multinational Enterprises and Social Policy.

D. Energy efficiency and greenhouse gas (GHG) emissions reduction goals should be set

Viscose production is a very energy-intensive process; as such, companies should properly manage their processes to save energy and cut GHG emissions. Many brands already have a commitment in place to cut GHG emissions, which extends to companies in their supply chain. They should set targets and transparently report on achievements measured against an established baseline. Viscose manufacturers should set their own GHG reduction targets and pathways to achieve them, especially via increased energy efficiency, for example through heat recovery, and a move towards sustainable renewable energy sources. The recommended approach here would be for brands to disclose supplier-level energy usage and GHG emissions data on an annual basis to show how suppliers are performing relative to targets. They could report their annual GHG emissions (in tonnes of CO₂ equivalent) through the Greenhouse Gas Protocol (n.d.), and energy efficiency through ISO:50001 (ISO, 2011). Chinese suppliers could also report annually via IPE’s PRTR (IPE, 2010).

E. Environmental damage in the surrounding environment should be remediated

Many factories are responsible for significant historical pollution in the areas where they operate. Brands should encourage manufacturers to engage with local communities and authorities and consult with them on the best ways to remediate any damage caused to their livelihoods and health. This could include corrective actions to ensure healthy water for drinking, personal use and irrigation (i.e. testing the quality of water, improving monitoring and reporting and ensuring corrective action if pollutants are detected), actions to restore ecosystems (i.e. cleaning up local water bodies and soil, and removing solid waste), etc.

5. Conclusion

Viscose has significant potential to be a sustainable fibre, but dirty production must be stamped out now to make way for the introduction of more responsible methods. Moving towards closed-loop manufacturing would minimise the negative impacts of viscose and modal, and needs to be scaled up and implemented across the entire industry, starting with high-volume facilities and new capacity. Brands and retailers have a responsibility to ensure that these more sustainable processes and technologies are rolled out across the industry, and be prepared to support manufacturers in this effort.

Brands and retailers should also map their supply chain, clearly communicate their responsible sourcing policies and assess their suppliers’ social and environmental performance through a gap analysis. They should engage with their suppliers and stop buying from factories that show no willingness to improve. Brands have the power to reward suppliers that are taking action to tackle these issues and help improve suppliers where shortcomings have been detected.

To implement the commitments in this roadmap, brands should integrate them into their responsible procurement policies as they see fit. These should be regularly verified and monitored on the ground, and transparently reported to the public.

In committing to clean viscose and taking measures to implement this roadmap, companies have a unique opportunity to set sustainable standards for viscose production and ensure the industry is able to respond to the growing demand for this fibre without jeopardising the health of the planet or the health of the people who produce it. By following this approach, viscose production can become a viable industry with a place in the sustainable economy of the 21st century.



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