
Dirty Fashion:
Spotlight on China
Why the Chinese Collaboration for Sustainable Development of Viscose will not be able to deliver on its promise
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Executive summary

China is the largest textile producer in the world and a dominant player in the global viscose market. With a 63% share of a growing market already worth US$12 billion worldwide, the Chinese viscose industry is also under pressure to clean up its performance. Ten leading Chinese viscose producers, along with two trade associations,[1] came together in March 2018 to form their own initiative to promote sustainable viscose sourcing and manufacturing. The so-called Collaboration for Sustainable Development of Viscose (CV) has launched a three-year Roadmap, which claims to provide a way for CV members to achieve sustainable viscose supply chains. However, far from driving meaningful transformation of the sector in line with best practices for responsible viscose production, this report shows that the CV Roadmap fails to drive ambition among its members, and gives Chinese producers the option to pick and choose between different standards.

At a time when global fashion brands and retailers are sending a clear message to their suppliers to commit to cleaner viscose-sourcing and -production methods, this approach appears short-sighted and unstrategic. To date, eight major brands and retailers – ASOS, C&A, Esprit, H&M, Inditex, Marks & Spencer (M&S), Next and Tesco – have publicly pledged to integrate Changing Market's *Roadmap towards responsible viscose and modal fibre manufacturing*[1] into their sustainability policies. This *Roadmap* sets the viscose industry on a pathway to closed-loop manufacturing, in line with the most ambitious current guidelines for clean viscose manufacturing: the European Commission's 2007 *Reference document on best available techniques (BAT) in the production of polymers*.[2] In addition, 160 brands have pledged to stop sourcing wood pulp (used in the production of viscose) from ancient and endangered forests, in line with their commitment to CanopyStyle, which goes beyond the approach set out in the CV Roadmap.

This report finds that, through the CV initiative, Chinese producers are committing to an approach that will make them fall short of what some viscose producers (including Austria-based Lenzing, a member of the CV initiative) are already achieving, or have committed to achieve in the coming years. This is all the more concerning considering ongoing government and media accounts, highlighted in this briefing, that speak of serious pollution issues around CV members' production sites.

1 China Chemical Fibres Association, China Cotton Textile Association, CHTC Helon, Funing Aoyang, Jilin Chemical Fibre, Sateri, Shandong Yamei, Shandong Yinying (Silver Hawk), Tangshan Sanyou, Xinxiang Baliu Chemical Fibre, Yibin Grace and Zhejiang Fulida.

In particular, this report finds that the CV Roadmap:

- **Lacks ambition**, by not obliging its members to achieve the highest level of production standard recommended by the Chinese government for companies selling to the international market, or a standard that would align with EU BAT, which several leading fashion brands and retailers support.
- **Allows members to pick and choose from a selection of certification standards and industry self-assessment tools**, which non-governmental organisations (NGOs) have criticised by for their lack of ambition (for example, the Programme for the Endorsement of Forest Certification (PEFC) standard) or for not covering some key parameters (for example, OEKO-TEX does not take a comprehensive approach towards viscose manufacturing).
- **Lacks clarity and transparency**, by failing to provide publicly available information about how the CV Roadmap will be enforced, monitored and verified, and whether it will sanction non-complying members.

For all these reasons, the CV initiative will not deliver on its promise to improve the environmental performance of CV members, which needs to be acknowledged and urgently addressed. This report provides a set of recommendations for how the CV secretariat can increase the level of ambition and commit to a robust approach to responsible viscose production, in line with the requirements of the CanopyStyle commitment and EU BAT as laid down in the Changing Markets *Roadmap*.

1. Introduction: China's place in the global viscose market

The rapid development of China's textile industry has become one of the biggest threats to China's environment. Historically one of the country's most polluting industries, it has repeatedly been identified as a major contributor to water stress, due to production generating large quantities of inadequately treated wastewater.[3] China's Ministry of Environmental Protection reports that the industry is the third-biggest source of wastewater, accounting for over 10% of China's total industrial wastewater in 2015 alone.[4] In 2017, the Chinese NGO Institute of Public & Environmental Affairs (IPE) recorded the textile industry committing over 300,000 violations of environmental standards.[5]

China is also the world's top viscose producer, accounting for around 63% of global viscose output. The industry, once concentrated in North America and Europe, shifted to Asia in the late 20th century as a result of its cheaper labour costs and looser environmental protection rules. In the first decade of the 21st century, China quadrupled its viscose-production capacity.[6]

Viscose is an increasingly popular textile widely used in high-street and high-end fashion alike. It is currently the third most commonly used fibre in the world, after synthetics and cotton.[7] As a fibre which is in principle biodegradable, viscose has the potential to be a sustainable alternative to oil-derived synthetics and water-hungry cotton. Also, market research suggests that biodegradability will be a key factor influencing consumers' purchasing decisions, boosting demand for materials that are plant-based and replenishable.[8] However, many viscose manufacturers have yet to adopt responsible production methods and sourcing practices to make viscose a sustainable fibre.

While Austria's Lenzing and India's Aditya Birla Group are the two largest individual players on the viscose market, collectively, Chinese companies dominate the industry. In 2017, the revenues generated by Chinese viscose producers reached more than US$7.3 billion. By way of comparison, in the same year the two next-largest markets, Europe and India, had estimated revenues of US$1.4 billion and US$1.2 billion respectively. Annual production of viscose staple fibre (VSF)[2] globally is nearly 5 million tonnes, of which China accounted for 3.6 million tonnes in 2017.[9]

The Chinese viscose-fibre industry is highly concentrated; in 2017, 65% of its viscose-fibre sales came from its top eight producers. Most of the companies are located in eastern coastal areas, as well as Xinjiang province in the country's northwest.[10]

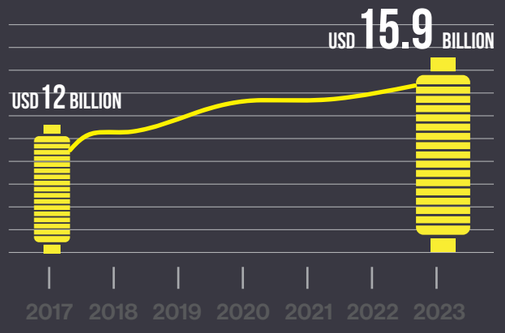
An investigation into conditions at viscose-manufacturing sites carried out by the Changing Markets Foundation in 2017[11] found that major Chinese viscose manufacturers were dumping highly toxic chemicals in local waterways, destroying marine life and directly exposing workers and local people to harmful chemicals. In a striking example of the industry's impact on iconic nature spots, pollution from viscose manufacturing was found to be polluting Lake Poyang, China's largest freshwater lake.

In response to China's considerable environmental challenges, in recent years the government has

2 Viscose fibre exists as viscose filament yarn and viscose staple fibre. Viscose filament yarn is a spun thread ready for weaving into textiles. Viscose staple fibres, which represent about 95% of the market 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.

CHINA IN THE GLOBAL VISCOSE FIBRE MARKET – KEY FACTS

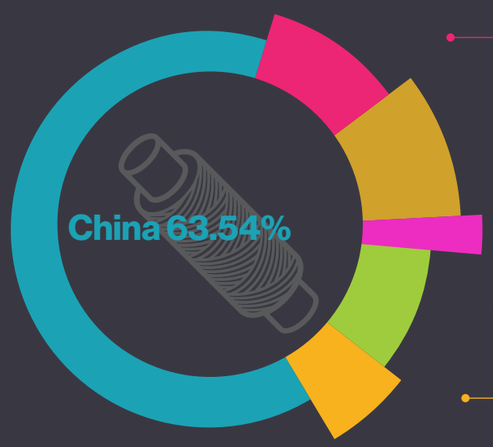
Size of the global viscose market:



Compound annual growth rate 2017-2023:

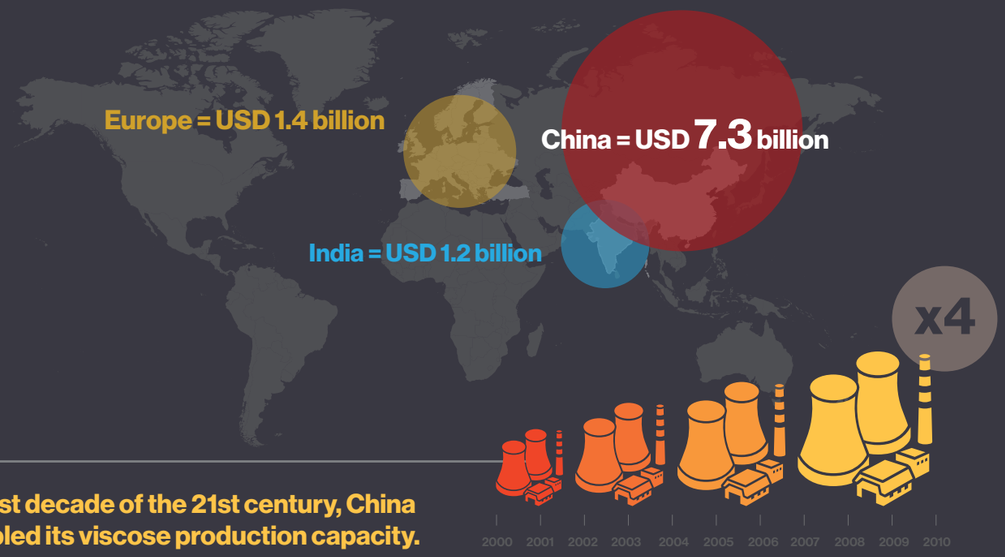
4.76%

Top countries in sales (2017)



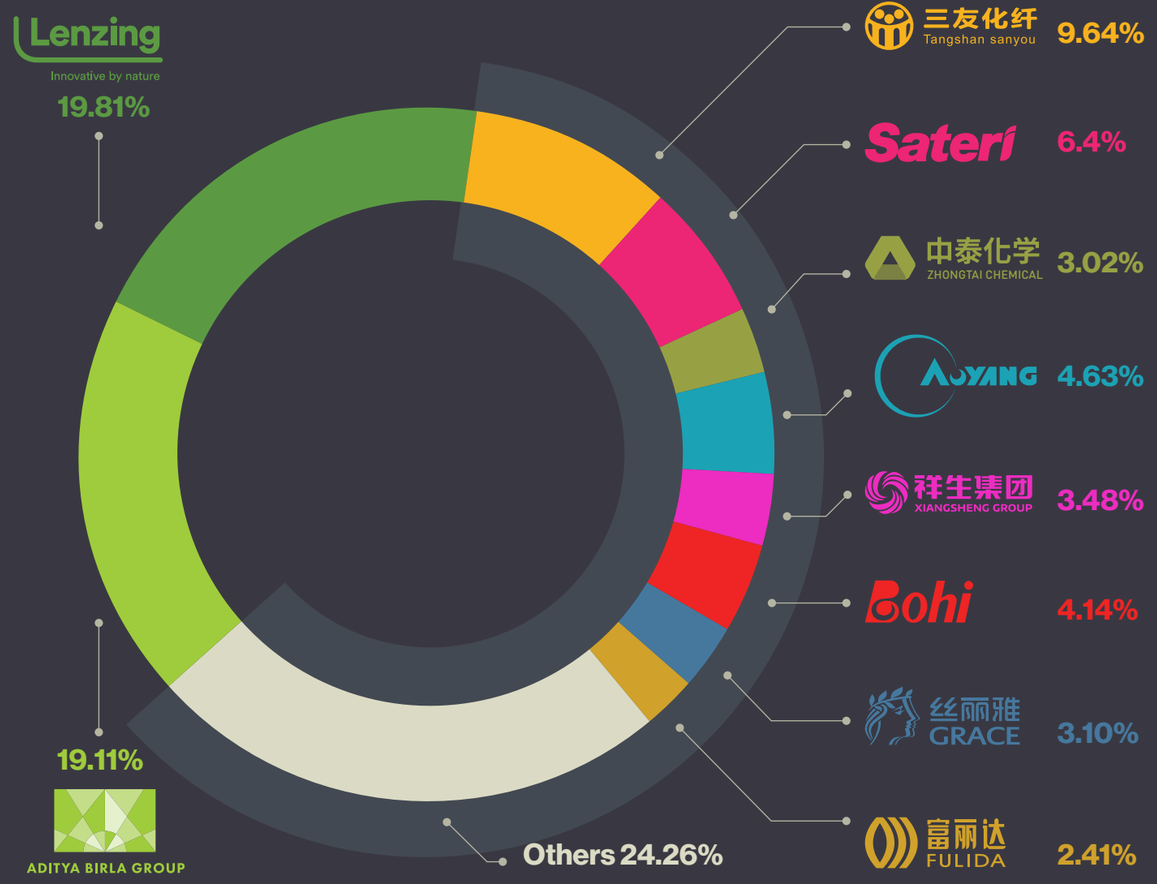
- India 10.03%
- Europe 9.22%
- North America 2.32%
- Southeast Asia 9.34%
- Others 5.56%

Top countries in revenue (2017)

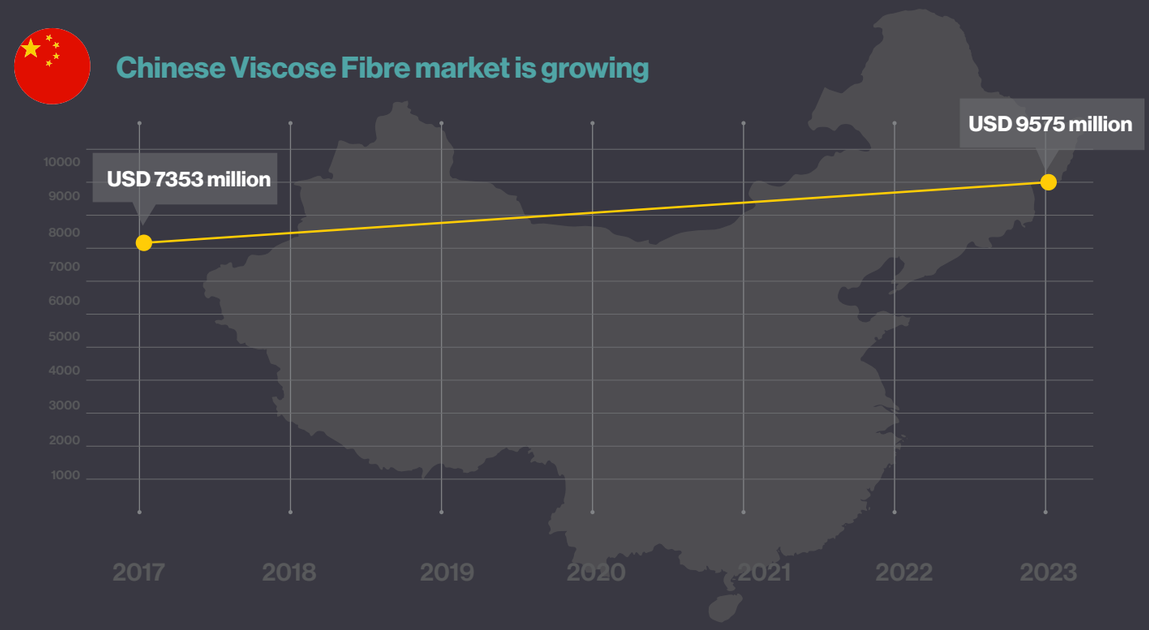


In the first decade of the 21st century, China quadrupled its viscose production capacity.

Top manufacturers by revenue (2017)



Chinese Viscose Fibre market is growing



strengthened enforcement of pollution regulations. This has significantly affected China's manufacturing sector. Tens of thousands of factories have been shut down and fined, and their management accused of criminal offences, following inspections by the Chinese Ministry of Environmental Protection. This wave of enforcement has also hit the textile industry.[12]

Due to this increased government scrutiny – combined with pressure from clothing brands, retailers and initiatives such as IPE's Blue Map Database (which provides greater transparency on the Chinese textile sector's environmental performance) – an industry-led initiative has been created to develop a more sustainable viscose-manufacturing industry in China. This initiative – the Collaboration for Sustainable Development of Viscose – brings together China's leading viscose producers, which collectively account for more than half of global VSF production. The initiative commits its members to adopt and implement a three-year Roadmap that promises to provide a sustainability pathway for the Chinese viscose industry and drive real market transformation. This briefing analyses the merits of this initiative, and provides recommendations for its improvement.

Tools for enhanced supply chain transparency

The Chinese NGO, IPE, has created useful tools that aim to increase transparency around the environmental performance of the Chinese textile industry, and to enable global customers to monitor Chinese companies' compliance with different standards. IPE collects environmental data and supervision records published by local governments, along with information mandatorily or voluntarily disclosed by enterprises, and makes them accessible on its online platform.[13]

For example, the Blue Map Database provides real-time emissions data for Chinese textile companies, including viscose producers, and shows whether they are complying with Chinese regulations and voluntary commitments, such as the Greenpeace Detox commitment.[14] The platform also provides access to violation records and gives users an opportunity to request that companies take corrective action. IPE has also developed a Green Supply Chain map, which links brands including Tesco, Inditex, Nike, Esprit and others to the environmental performance of their suppliers.[15]

2. The impacts of viscose production

Several aspects of the viscose supply chain are environmentally destructive, including the potentially devastating impacts of wood-pulp production on ancient and endangered forests, pollution and the release of toxic chemicals at fibre-manufacturing plants, and the unsustainable use of water and harmful chemicals in the dyeing and finishing process. With responsible logging and chemical management, viscose can be produced in a way that minimises impacts on people and the environment. However, many manufacturers across the industry are yet to adopt such best practices.

According to Canopy, dissolving pulp for viscose production wastes approximately 70% of the tree and is a chemically intensive manufacturing process.[16] Moreover, around 30% of viscose that goes into clothing comes from pulp logged from endangered and ancient forests.[17] In addition, the viscose-fibre manufacturing process still depends on the use of toxic chemicals to transform wood pulp into viscose fibre, and, as a result, is linked to alarming environmental and health impacts at and around production sites.

Carbon disulphide (CS_2), which is at the heart of the process, is a toxic and endocrine-disrupting chemical linked to numerous serious health conditions. Most notoriously, it was found to be a cause of insanity in factory workers over a century ago,[18] but it also contributes to illnesses ranging from kidney disease and Parkinson's-like symptoms to heart attack and stroke.[19] The chemical can be present in both water and air as a result of pollution from viscose factories.[20]

Similarly, sodium hydroxide (NaOH; also known as caustic soda) and sulphuric acid (H_2SO_4), which are used in the process, as well as hydrogen sulphide (H_2S), which is created as a by-product, are linked to severe negative impacts on people exposed to them. These include eye damage, function impairment, neurobehavioural changes,[21] skin burns and shortness of breath. Evidence suggests that occupational exposure to sulphuric acid mists, in combination with other acid mists, can be carcinogenic.[22]

Without proper chemical management and treatment, these toxic chemicals find their way into the air and waterways surrounding viscose factories, affecting the delicate natural balance of ecosystems and water bodies. Pollutants characteristically found in wastewater from viscose production are sulphuric acid, sulphates, sulphur and sulphides. There can also be some metals present, namely zinc salts. Inadequately treated wastewater can also contain a lot of organic material, which can lead to high levels of chemical oxygen demand (COD); this means that less dissolved oxygen is available for aquatic organisms, such as fish, resulting in their death.[23]

Deforestation in Indonesia for pulp being sold to viscose producers, including Sateri (Source: Rainforest Action Network)

Foaming effluent coming from a discharge pipe of viscose factory in Indonesia

Best available techniques (BAT) for the production of polymers

The EU's BAT Reference Document (BREF) on Polymers was published in 2007 and defines the most effective techniques for achieving environmentally responsible production of synthetics and cellulose-based fibres, including viscose.[24] Conclusions on BAT are used as the main reference when issuing operating permits and licences in the EU, which are granted by authorities in Member States.[25]

The Polymers BREF was drafted under the auspices of the European Commission, and is based on an exchange of information between EU Member States, the EU viscose industry and NGOs carried out between 2003 and 2005. It is based on operating data supplied by EU industry players, meaning it reflects what the best performers in the industry were already achieving over a decade ago.

The world's two biggest manufacturers, Aditya Birla Group and Lenzing, are currently developing plans to bring all their manufacturing sites in line with EU BAT. Lenzing already has two sites performing in line with EU BAT (Lenzing in Austria and Nanjing in China), and has established a global standard based on EU BAT for all its factories.[26]

In the Changing Markets Foundation's *Roadmap towards responsible viscose and modal fibre manufacturing*,[27] we identified EU BAT on viscose (as described in the Polymers BREF) as the most comprehensive and ambitious standard; it sets limits on chemicals usually discharged from the viscose-manufacturing process, and addresses both air and water pollution during VSF production.

Eight major brands and retailers – ASOS, C&A, Esprit, H&M, Inditex, M&S, Next and Tesco – have already publicly pledged to integrate Changing Markets' Roadmap into their sustainability policies. With this commitment, clothing brands and retailers are sending a clear message to viscose manufacturers that they expect the industry to move towards more responsible viscose production by 2023-2025.

The Roadmap towards responsible viscose & modal fibre manufacturing was published by Changing Markets in February 2018

3. Collaboration for Sustainable Development of Viscose (CV)

In March 2018, the Chinese viscose sector launched its own industry-led initiative for the development of a sustainable viscose-manufacturing industry in China – the so-called Collaboration for Sustainable Development of Viscose (CV). CV brings together China's ten largest viscose producers, which collectively account for about 60% of the world's VSF production.[28] The initiative also includes two trade associations – the China Chemical Fibre Association and the China Cotton Textile Association – and lists Austrian viscose producer Lenzing as a member.[29]

In August 2018, the initiative launched its CV Roadmap, which includes ten best practice standards that cover the full viscose supply chain – from raw-material sourcing to responsible production and product safety. This means its members are expected to adopt a number of certification schemes and standards, including certification of all viscose cellulosic raw materials by either the PEFC or the Forest Stewardship Council (FSC); alignment with Zero Discharge of Hazardous Chemicals (ZDHC) wastewater guidelines; certification of facilities under OEKO-TEX Step; and completion of the Higg Facility Environmental Module (FEM) 3.0 using self-assessment.

CV members are expected to achieve preselected standards within three years by meeting the CV Roadmap's basic requirements by June 2019 and its advanced requirements by the end of 2020. This is what the CV identifies as a system of continuous improvement. Although the initiative identifies the CV Roadmap as a 'living document', which will be subjected to periodic reviews and updated as needed, it is not clear whether there are plans to consistently scale up its ambition in line with a policy of continuous improvement.

The CV initiative was launched in March 2018 and brings together ten leading Chinese viscose producers (Source: cvroadmap.com)

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CHINA CHEMICAL FIBERS ASSOCIATION
CHINA COTTON TEXTILE ASSOCIATION
TANSHAN SANYOU
FUNING AOYANG
YIBIN GRACE
SHANDONG YAMEI
SATERI
ZHEJIANG FULIDA
JILIN CHEMICAL FIBRE
HENGTIAN HELON
XINXIANG BAILU CHEMICAL FIBRE
SHANDONG YINYING

View from the ground: pollution at manufacturing sites operated by CV members

During Spring 2017, the Changing Markets Foundation worked with local NGOs and investigators to carry out on-the-ground investigations at viscose-manufacturing sites in China. The team visited seven viscose-production sites, including some facilities operated by the following CV members: **Tangshan Sanyou** (Tangshan Sanyou Group Xingda Chemical Fiber Co. Ltd and Tangshan Sanyou Group Yuanda Chemical Fiber Co. Ltd, both situated in Hebei province), **Sateri** (Jiangxi Chemical Fiber Co. Ltd and Jiujiang Fiber Co. Ltd), and **Shandong Silverhawk Chemical Fibre** and **CHTC Helon** (both situated in Shandong province).

The findings of the investigation were published in Changing Markets' *Dirty Fashion* report.[30] At all sites, including factories belonging to the aforementioned four CV members, we found clear evidence of viscose producers dumping untreated wastewater, contaminating local lakes and waterways or discharging air pollutants that exceeded national and local environmental standards. Air pollution characterised by an intense smell of rotten eggs was observed around all four CV members' sites. The investigators found levels of hydrogen sulphide exceeding the permitted limits at Sateri's Jiangxi site, levels of carbon disulphide exceeding permitted limits in the residential area around the Tangshan Sanyou and CHTC Helon sites, and levels of both chemicals in breach of regulations at Shandong Silverhawk Chemical Fibre.

We also found evidence of severe water pollution at all four sites. Sateri's Jiangxi factory was found discharging effluent in Lake Poyang – China's largest freshwater lake; home to several critically endangered species (including the finless porpoise), it provides critical habitat for half a million migratory birds each year. Pollution from viscose manufacturing there has played a role in turning the water black, killing fish and shrimps, and stunting crop growth.

The COD level of residential drinking water was found to be above the regulatory limit around the sites operated by Sateri and Tangshan Sanyou. Villagers around the Tangshan Sanyou factories complained that water pollution had impacted fisheries, with dead fish regularly found near wastewater outfalls. Local people living around the CHTC Helon and Silverhawk factories had stopped drinking well water because they feared it would make them ill, and even avoided using it for irrigation because it could kill their plants. According to some locals, in the past few years an increasing number of people living near the Shandong Helon factory had died of cancer; they reported that cases of lung cancer, gastric cancer and oesophageal cancer were common.[31]

Since our investigation, the Chinese government and media have recorded multiple violations of national and local regulations and pollution incidents at sites operated by CV members. In 2018 Sateri's newest plant, Fujian Fibre Co. Ltd, was issued with several violation notices. On separate occasions, the site was found to be improperly managing hazardous waste and sewage treatment,[32] and the company reported several instances of excessive dust emissions and abnormal nitrogen oxide emissions.[33] In July 2017, Sateri Jiujiang and Shandong Yamei Technology were fined over US$100,000 (¥724,797)[34] and over US$300,000 (¥2,465,208)[35] respectively for discharging wastewater that exceeded national emissions standards.

In October 2017, the Xinxiang Environmental Protection Bureau issued Jilin Chemical Fiber Refco Group Ltd with a penalty for improperly stacking coal, which was leading to dust pollution.[36] In the same month, Xinxiang Chemical Fiber was fined for operating its boilers despite the Xinxiang City Government calling for their suspension due to an orange alert signalling heavy pollution.[37] Still, in November 2017, *The Paper* reported that Xinxiang Chemical Fiber was continuing to operate despite its heavy pollution warning.[38] In the same month, residents in Weifang complained about a pungent smell, which an investigation by the local Environmental Bureau tracked to CHTC Helon.[39]

Pollution from Chinese viscose factories found during investigation in spring 2017

4. Chinese companies' approach to addressing the environmental impact of viscose manufacturing

With regards to wood-pulp sourcing, the CV Roadmap stipulates that all its members use viscose cellulosic raw materials certified by either the PEFC or the FSC. The CV Roadmap does not require or recommend an additional independent audit, such as the CanopyStyle Audit, to ensure that wood is not sourced from ancient and endangered forests.

On the fibre-manufacturing side, CV uses the Chinese Clean Production Standard to address the impacts of VSF production. According to communication with the CV secretariat, the Clean Production Standard was updated in summer 2018 and is based on the standard formulated in 2014 under the leadership of the China Chemical Fibres Association (Assessment Indicator System of Production for Viscosity Industry (HX/T 52005-2014)). However, our researchers could not find the updated version online.

Although not mandatory, the Chinese government drafted and recommended the Clean Production Standard. Assuming that the 2018 version uses the same framework as the 2014 version, it defines three levels, with Level I being the most ambitious:

- **Level I** for an 'internationally advanced' level of cleaner production;
- **Level II** for a 'domestic advanced' level of cleaner production; and
- **Level III** for a 'domestic basic level' of cleaner production.

The CV Roadmap was launched in August 2018 and includes a range of standards on wood pulp sourcing and manufacturing (source: cvroadmap.com)

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Collaboration for Sustainable Development of Viscose (CV) Roadmap

		Technical Standards	Evaluation Subject: Facility	Evaluation Subject: Product	Basic Requirements (2018.1–2019.6)	Advanced Requirements (2019.7–2020.12)
Raw Material		PEFC or FSC		√	Source FSC® or PEFC™ certified pulp	Purchase FSC®or PEFCTM certified pulps, and take proactive management measures to reduce the risk of using wood products from High Conservation Value (HCV) or High Carbon Stock (HCS) forests
			√	√	Pass the FSC® or PEFC™ Chain-of-Custody (CoC) audit for manufacturing facility	Pass the FSC® or PEFC™ Chain-of-Custody (CoC) audit for manufacturing facility
		Pulp purchased from legal sources and with legitimate permits	√	√	Legal compliance	Legal compliance
Manufacturing		Viscose Fiber Industry Rules (2017)	√	√	Full compliance	Full compliance
		Cleaner Production Assessment Standard for Man-made Cellulous Fibers (Viscose) Manufacturing	√	√	Achieve domestic basic level	Achieve domestic advanced, or international advanced level
		ZDHC	√	√	Wastewater discharges shall meet the foundational limits for conventional parameters under the ZDHC Wastewater Guidelines	Wastewater discharges shall meet the foundational limits for conventional parameters and the reporting limits for MRSL parameters, while wastewater treatment sludge shall meet sludge-related requirements
		OEKO-TEX® STeP	√	√	Obtain the STeP by OEKO-TEX® certification scoring at Level 1 or above	Option 1 : Obtain the STeP by OEKO-TEX® certification, scoring Level 2 or above; Option 2: Develop improvement goals based on the Higg FEM 3.0 self assessment, and pass the third-party verification audit to confirm meeting the goals within 36 months of joining CV. Additionally, pass the SA8000® or BSCI audit Note: Options 1 and 2 are alternative choices for members; only one option is required to be completed.
		Higg Index	√	√	Complete a Higg FEM 3.0 self assessment	
		BSCI or	√	√	—	
product		OEKO-TEX® STANDARD 100		√	Obtain certification	Obtain certification
		GB/T 14463 Viscose staple fiber	√	√	Conformance to standards	Conformance to standards

5. Shortcomings of the CV Roadmap

Our analysis of the CV Roadmap identifies a number of pitfalls that the CV needs to address to ensure this initiative drives real transformation.

5.1 Lack of transparency and clarity

There is very limited public information available about the specifics of the CV Roadmap, including what the different certification schemes and selected standards entail, how it will be enforced, monitored and verified, and whether that process will be independent and transparent. There is also an absence of information about whether any sanctions will be taken against members who do not comply with its requirements.

The *Three-year action plan for green development of the regenerated cellulose fibre industry* report on the official CV website is only available in Mandarin,[40] making it difficult for the global marketplace to understand how the selection of standards is meant to support the transition to responsible viscose production in practical terms. Our researchers could not find the updated Clean Production Standard that the CV uses in its Roadmap on either the CV website or any government platform, which calls into question the transparency of the initiative.

Moreover, the units of measurement used for the pollution parameters identified by the Clean Production Standard are in most cases not comparable to the units used by internationally recognised standards and best practices, such as the EU Ecolabel and EU BAT. This makes it almost impossible for third parties to assess the level of ambition behind the CV Roadmap, and how its requirements compare to what the best-performing producers in the viscose industry are already achieving.

This lack of transparency and clarity makes it close to impossible for international stakeholders to meaningfully scrutinise the Chinese viscose industry, and enables CV members to create an illusion of progress while, in reality, failing to take steps to transition to more responsible production methods.

5.2 Weak ambition and lack of measures to drive continuous improvements

The CV initiative is meant to provide a platform for Chinese viscose producers '*to achieve sustainable viscose and help their customers deliver on their sustainability commitments*'.[41] However, there are several problems with this – highlighted below – including the fact that the initiative does not oblige its members to achieve the level of production intended for companies selling to the international market (Level I, i.e. the most ambitious level).

5.2.1 Responsible forestry requirements

CV members have the option of demonstrating responsible harvesting and respectful forestry practices through PEFC certification. PEFC and its globally associated certifications, such as the Sustainable Forestry Initiative, have been criticised or found inadequate by a number of NGOs (including the World Wildlife Fund (WWF),[42] Sierra Club[43] Canopy[44] and Greenpeace) for lacking credibility and failing to ensuring responsible forest management. In March 2018, Greenpeace International also withdrew its membership of the FSC, stating: '*we no longer have confidence that FSC alone can consistently guarantee enough protection, especially when forests are facing multiple threats*'.[45] This indicates that relying only on FSC certification (or, even worse, on the PEFC) is no longer a sufficient guarantee of sustainable sourcing, and that further measures are needed.

A more appropriate and comprehensive approach to verifying performance at this stage of the supply chain would be to implement the requirements of the CanopyStyle Guide's tool, *Making the cut: Sustainable cellulosic fibre staircase,* which sets out expectations of rayon and viscose producers.[46] The tool provides six levels of ambition, from 'High risk' to 'Gold' levels, and encourages suppliers to continuously '*move up the staircase*'.

Sourcing fibres from FSC-certified forests is only one of the requirements with which companies need to comply to achieve Canopy's 'Silver' level. The foundational requirement is completion of CanopyStyle Audits to verify that no sourcing from ancient and endangered forests or controversial sources is taking place. In other words, the CanopyStyle Audits confirm whether viscose fibres are coming from the right or wrong places globally, and FSC then layers overtop to confirm sustainable forest practices regionally. In 2017–2018, Aditya Birla Group and Lenzing completed the CanopyStyle Audit, along with ENKA and three Chinese producers: Tangshan Sanyou, Sateri[47] and Zhejiang Fulida.[48]

Beyond simply mitigating risk, leading viscose producers are expected to:

- support research and development of alternative fibres, such as recycled fabrics or agricultural residues, and work towards sourcing fibre made from these lower-impact, non-wood alternatives;
- demonstrate a business strategy and investments for making these alternative fibres commercial-scale and cost-competitive;
- meet CanopyStyle Audit expectations for other products and businesses in which it uses wood products; and
- supporting lasting, legislated protection in critical areas of ancient and endangered forests.

If the CV persists in following its lowest-common-denominator approach by relying on PEFC and/or FSC certification only, there is a real risk that CV members will find themselves complicit in the destruction of ancient and endangered forests and eliminated from sourcing for retailers, brands and designers that do not want endangered orangutan or bear habitats traced to their stores.

5.2.2 Responsible production requirements

At the next stage of production, i.e. the processing of wood pulp into fibre, the Clean Production Standard defines three levels of ambition that aim to address environmental impacts from production. However, CV members are not required to reach the highest level (Level I), which is referred to as the 'internationally advanced' level and, according to our analysis, comes the closest to the EU BAT.

According to communication between Changing Markets and the CV secretariat, CV members have generally met the requirements of Level III, meaning 'basic domestic' level of production. The CV Roadmap instructs every member company to meet advanced domestic levels of cleaner production (Level II) by 2020, but does not compel them to go beyond this to reach EU BAT, or even Level I (the 'internationally advanced' level of cleaner production).

Our analysis of information supplied by the CV secretariat shows that the limits on emissions of sulphur to air are weak and not in line with EU BAT. For example, the BREF document shows operational data from a European plant that, in 2007, had already achieved 96–98% recovery of carbon disulphide and elementary sulphur. However, the CV Roadmap only requires CV members to achieve a minimum of 89% sulphur recovery by 2020.

Limits set on zinc to water by the CV Roadmap are also weak and fall short of EU BAT values. Moreover, the CV Roadmap does not require members to track COD in water in viscose-fibre production, which is a parameter included in EU BAT.

Table 1: Comparison of air and water pollution parameters between EU Best Available Techniques (BAT) and the Clean Production Standard (CPS) levels I and II

Pollution parameters	EU BAT	CPS Level II		CPS Level I	
废气 Waste gas-related data					
排放到空气中的硫 S (sulphur) to air	12–20 kg/t	Sulphur recovery rate ≥89% (=25 kg)*	*Value in brackets was provided by the CV Secretariat and suggests that CPS limit is not in line with the EU BAT standards.	Sulphur recovery rate ≥92% = (18.9 kg)*	*Value in brackets was provided by the CV Secretariat and suggests that CPS limit is in line with the EU BAT standards.
水 Water-related data					
废水中硫酸根离子 SO42- (sulphate) to water	200–300 kg	Recovered calcium sulphate ≥400 (-434)*	Not comparable to EU BAT. *Value in brackets was provided by the CV Secretariat but is not clear.	Recovered calcium sulphate ≥500 (-330)*	Not comparable to EU BAT. *Value in brackets was provided by the CV Secretariat but is not clear.
COD	3,000–5,000 g/t	/	CPS does not measure COD.	/	CPS doesn't measure COD.
Zn	0.01–0.05g/kg (10-50g)*	5 mg/l = (275g)*	Not directly comparable to EU BAT. *Value in brackets was provided by the CV Secretariat and suggests that CPS limit is not in line with the EU BAT standards.	2 mg/l =(90g)*	Not directly comparable to EU BAT. *Value in brackets was provided by the CV Secretariat and suggests thatCPS limit is not in line with the EU BAT standards.

In an exchange with Changing Markets, the CV secretariat stated that there are no limits for COD because water-treatment processes differ among CV Roadmap members, and, while some have their own wastewater treatment plant, others use a centralised plant. Even if this were the case, investigations by Chinese NGO IPE have shown that many centralised industrial wastewater treatment facilities in China turn out to be '*centralized sources of pollution*' because they fail to meet legal discharge standards. Statistics from IPE's China Water Pollution Map show that, between 2008 and 2013, wastewater treatment facilities around the country had an average of 1.4 violation records per facility.[49] This shows that additional requirements are needed for CV members, which are committing to becoming more responsible viscose producers, to verify that their COD levels do indeed comply with the highest standards.

In contrast, Austrian producer Lenzing already has two sites performing in line with EU BAT (Lenzing in Austria and Nanjing in China), and has set up a global standard based on EU BAT for all its factories. The company has measured relevant pollutant values (sulphur to air, sulphate to water, zinc to water and COD), and confirms that these are in line with EU BAT. India's Aditya Birla Group is also in the process of developing a plan to achieve EU BAT at its sites. Moreover, any new viscose producer operating on the European market will need to comply with EU BAT levels to obtain operating permits and licences, which EU Member State authorities grant.

Given that the Chinese producers that are members of the CV initiative operate on the international market, the lack of requirement to produce in line with Level I ('internationally advanced' level of cleaner production) seems like a major failing in the CV Roadmap. In addition, given that many brands have pledged to source from suppliers committed to EU BAT, we recommend that the CV Roadmap adopts an approach in line with this.

5.3 Failure to adopt a holistic approach

The CV initiative seeks to address environmental impacts throughout the viscose supply chain. However, it sets out to do this is by piling together a variety of certification schemes, standards, industry initiatives (e.g. ZDHC) and self-assessment tools (such as the Higg Index). Our analysis shows that many of these are incomplete, and/or only certify a small part of the supply chain or simply the quality of the end product, and often lack sufficiently strict criteria.[50]

It is highly concerning that, in many cases, the CV initiative has not selected the most ambitious standards available and is allowing its members to pick and choose which standards they wish to use (e.g. PEFC or FSC, even though these do not achieve the same level of ambition). In addition, our previous analysis showed that OEKO-TEX does not cover parameters specific to the viscose-manufacturing process, while ZDHC is only now working on its standard for the production of viscose,[51] the ambition of which remains to be seen. As things currently stand, using any one of these schemes as proof of responsible manufacturing would convey the false impression that viscose production is 'clean', without accounting for the full range of relevant pollution parameters or every stage of the viscose-production chain at which environmental impacts occur. In addition, it is of concern that CV members are only required to reach Level II of the CPS, which is not in line with what other companies producing for the international market are achieving, or committing to achieve, within a similar timeframe.

As a rule, any industry initiative that aims to improve environmental performance must go beyond national regulatory requirements and should only accept the best industry players, ensuring the level of ambition remains high and reflects the top-performing percentile of companies in that industry. The CV initiative should also put in place criteria on how its members are expected to report on progress – and what happens if they fail to comply with the requirements. Based on our analysis, the CV Roadmap currently falls far short of these guiding principles, and its members cannot therefore be considered to be producing viscose responsibly.

6. Conclusion and recommendations

Our analysis shows that the CV Roadmap, in its current form, constitutes a weak attempt to clean up the Chinese viscose industry and will not lead to transformation of the sector in line with international standards of responsible production. This is especially concerning at a time when other big players on the market are already achieving higher standards, or have committed to achieving them in the near future.

While Chinese companies collectively occupy the largest share of the viscose-fibre market, as global suppliers they also have many major European and North American brands as their key customers. With many of these brands adopting a more robust approach to responsible sourcing and manufacturing of viscose, Chinese manufacturers run the risk of losing out to their competitors in other parts of the world, which are coming forward with more ambitious plans to improve their operations. Our analysis shows that brands and retailers should not consider membership of the CV initiative and commitment to the CV Roadmap as proof of good environmental performance and responsible production methods – unless the initiative undergoes significant reform, in line with the recommendations outlined below.

Recommendation 1: Higher ambition

For the CV Roadmap to drive meaningful transformation, it needs to oblige its members to move towards the most ambitious sourcing and production standards. While the Roadmap's current requirements do define milestones to drive improvements in the Chinese viscose industry, the level of ambition should be raised. Requirements for wood-pulp sourcing should, at a minimum, include completing the CanopyStyle Audit, along with the other provisions of the CanopyStyle Guide's tool. Without this, there is a real risk that CV members will find themselves complicit in the destruction of ancient and endangered forests. For viscose manufacturing, the CV Roadmap should stipulate that members should go beyond Level II of the CPS by requiring them to implement EU BAT by 2023–2025, as set out in the Changing Markets *Roadmap*.

Recommendation 2: Clarity and transparency

The CV initiative must provide more clarity about how the standards and initiatives included in the CV Roadmap will contribute to cleaner viscose production. Specifically, the CV must lay down emissions limits for relevant pollution parameters (see Table 1) in a form that is comparable to, and aligns with, the internationally recognised standards – specifically, EU BAT on Polymers. Only this will ensure meaningful scrutiny of the Chinese viscose industry by international stakeholders. Moreover, the initiative must disclose how the CV Roadmap will be enforced and progress measured and verified. Monitoring and verification should be independent and regular, and the progress of CV members transparently disclosed on the CV website.

Recommendation 3: Incentive for continuous improvement

The CV initiative should create an incentive for Chinese viscose producers to improve over time, and as technology progresses, by consistently ramping up the ambition of the CV Roadmap in line with a policy of continuous improvement. The initiative should also commit to addressing non-compliance by defining sanctions and exclusion criteria for cases where members consistently fail to meet its requirements.

Recommendation for ZDHC: Guidelines for measuring and recording performance in the viscose manufacturing process

This report points to an urgent need for guidelines for consistent measuring and recording of pollution parameters that could be applied across viscose producers in different countries. Such guidelines are required to make producers' performances internationally comparable and subject to meaningful scrutiny. ZDHC could develop these under its upcoming framework of guidelines for wastewater, sludge, waste and air emissions specific to man-made cellulosic-fibre production. To ensure that they drive a shift to responsible viscose production, the ZDHC should set the bar high from the outset by aligning its standards with the best available technology – meaning, at a minimum, with EU BAT values.

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