Collaboration for Sustainable Development of Viscose

2019 SUSTAINABILITY REPORT

About this Report

This Report was jointly prepared by the Social Responsibility Office of the China National Textile and Apparel Council (CNTAC) and the China Chemical Fibers Association, and reviews the key sustainability level of Collaboration for Sustainable Development of Viscose (hereinafter referred to as the “CV”) in 2019 and elaborates on the sustainable governance progress and continuous improvement measures of the CV. This Report also provides a vision for sustainability.

Reporting Organization:

Collaboration for Sustainable Development of Viscose (CV), established on March 15, 2018, is a public governance organization based upon the principle of voluntariness. It is sponsored by viscose manufacturing enterprises, associations, upstream and downstream enterprises along the industrial chain. As of December 2019, CV has a total of 12 members and 163 downstream enterprises as industrial chain members.

CV members (in no particular order)

Industry associations

1. China Chemical Fibers Association
2. China Cotton Textile Association

Viscose producers

3. Tangshan Sanyou Group Xingda Chemical Fiber Co., Ltd.
4. Sateri Group
5. Jilin Chemical Fiber Group Co.,Ltd.
6. Shandong Yamei Technology Co., Ltd.
7. Shandong Silverhawk Chemical Fiber Co.,Ltd.
8. Xinxiang Chemical Fiber Group Co., Ltd.
9. Yibin Grace Group Co., Ltd.
10. Xinjiang Zhongtai Textile Group Co., Ltd.
11. Funing Aoyang Technology Co., Ltd.
12. CHTC Helon (Weifang) New Materials Co., Ltd.

Industrial Chain Members of the CV

In 2019, CV approved 163 downstream enterprises to become its industrial chain members. The list of these enterprises is shown in Appendix II. As these members are not involved in viscose production, their core performances are not disclosed in this Report.

Report period:

From January 1, 2019 to December 31, 2019, including some historical information and data.

Compiling principles:

This Report quotes the reporting indicators of United Nations’ Sustainable Development Goals (SDGs) and the China Sustainability Reporting Guidelines for Apparel and Textile Enterprises (2008 Edition) (CSR-GATEs: 2008) as well as the reporting requirements of the Guide on Social Responsibility for Chinese Industrial Enterprises and Industry Associations 2.0, and reviews the members’ sustainability performances during the reporting period.

Information source:

All information and data in this report are provided by the CV members, including CV members’ public information as well as statistics and summaries of data, which all are approved by the CV members before disclosure.

Report verification:

Refer to AA1000 Assurance Standard (2018), assurance level II, moderate assurance principle to review the Inclusiveness, Substantiality and Responsiveness of the Report. See Page 57-58 for details of the verification report.

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MESSAGE

Duan Xiaoping

Vice President of the China National Textile and Apparel Council

Chairman of the China Chemical Fibers Association

Environmental protection and green-sustainable development are a to-be-or-not-to-be question for the viscose industry. The aim of the CV is to define a path of sustainable development for this industry; guide and complete the green transformation, thus establishing an image of green and sustainable development for CV. Instead of giving shelters to non-compliant businesses, CV would expose and remove those not in lines with CV Roadmap and those triggering environmental problems.

Liu Yong

General Manager of Tangshan Sanyou Group Xingda Chemical Fiber Co., Ltd.

Director Unit of Collaboration for Sustainable Development of Viscose

The industrial chain for textile is sharing opportunities and risks. Even though all parties in this industry are contributing to its sustainable development, the complexity in industrial chain has prevented brands from accessing information on textile sources. By serving as a direct bridge for communication between fiber producers and brands, CV promotes continuously the transparency and green development of the entire industrial chain.

Yan Yan

Director of Social Responsibility Office for the China National Textile and Apparel Council

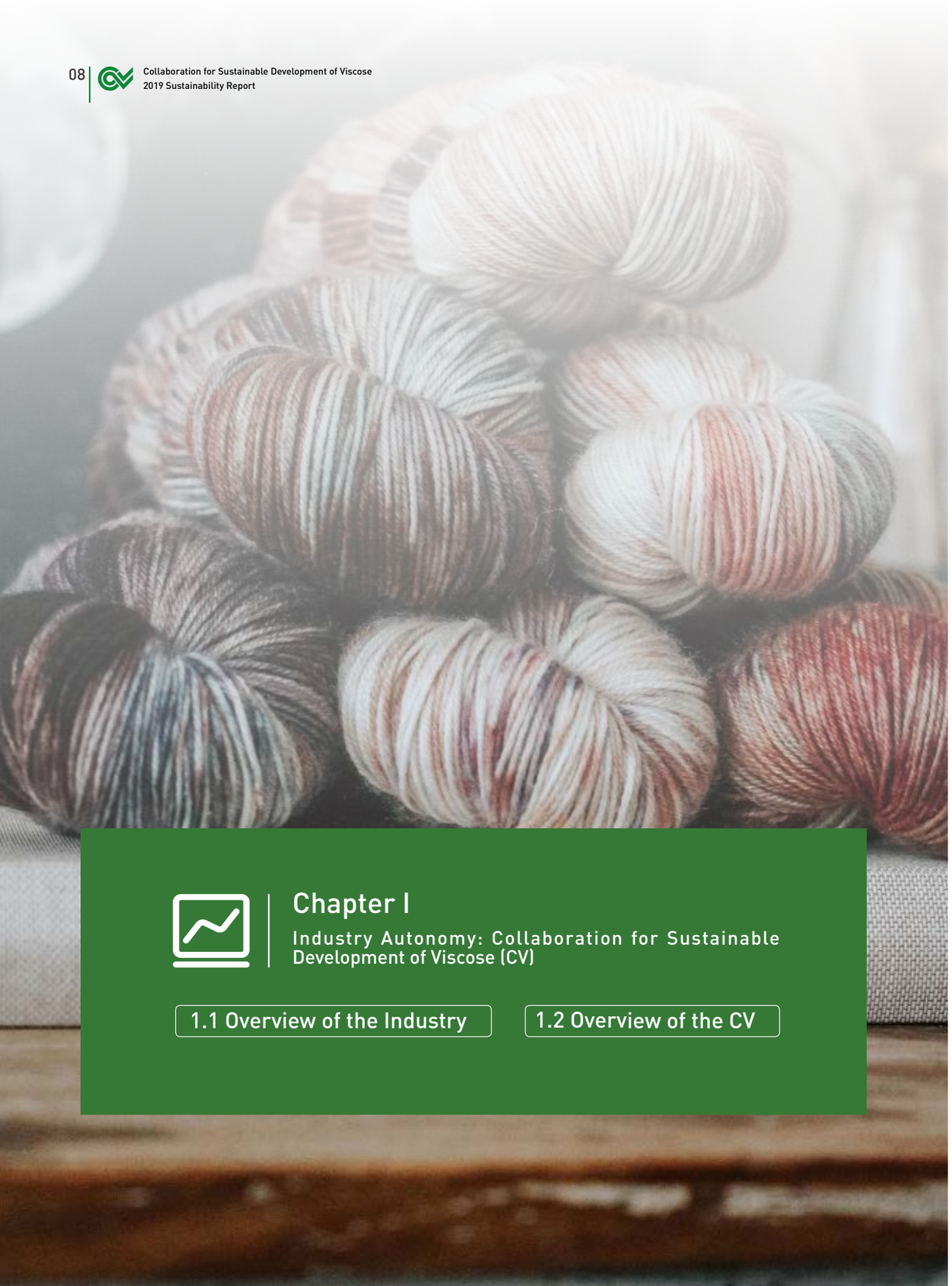
Green development of textile raw materials is the foundation or base for sustainable transformation of the fashion industry. Since its inception, CV has taken the initiative to disclose information and actively communicate with stakeholders all over the world on updates of the status quo, challenges and visions for CV. This has gradually improved transparency in information communication, and formed a sustainable governance mechanism for multiple parties. CV has released the Sustainable Development Report for two consecutive years, which deserves recognition and appreciation on its role of facilitating the coordination and sustainable growth of the entire industrial chain.

Sun Jian

Vice President of Communication and Sustainability, Sateri

Deputy Director Unit of Collaboration for Sustainable Development of Viscose

The sustainable development of viscose has taken center stage for all stakeholders. In recent years, more organizations have joined to develop standards and guidelines for sustainable viscose. As a business representative of viscose industry, CV would like to work with relevant institutions to formulate and improve industrial key performance indicators. At the same time, CV calls for guidance and integration of different standard systems in order to create a unified closed loop production roadmap for the viscose industry.



Chapter I

Industry Autonomy: Collaboration for Sustainable Development of Viscose (CV)

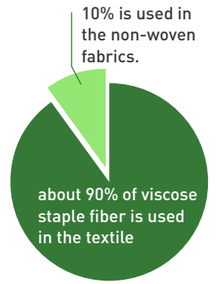
1.1 Overview of the Industry

(1) Characteristics and main application of man-made celloluse fiber

Man-made Cellulose Fiber (MMCF) is the third largest fiber category following polyester and natural fiber. The raw material of MMCF is natural cellulose found in wood, bamboo, cotton, and linen. The fiber offers good moisture absorption, dyeing, and comfort. The main types of MMCF are viscose fiber (including modal), lyocell fiber, acetate, and cuprammonium fiber.

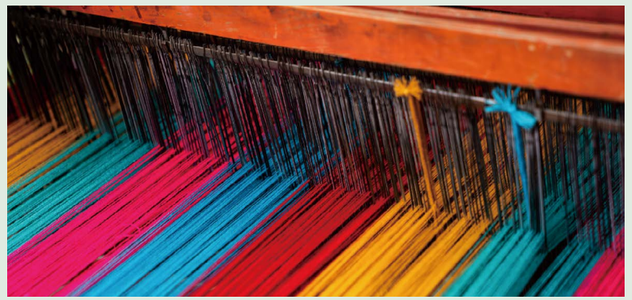
Viscose staple fiber is the main product of MMCF, accounting for more than 80% fiber of the industry (or market)[1]. According to its usage, about 90% of viscose staple fiber is used in the textile and apparel field as an important raw material for the textile industry, while the other 10% is used in the non-woven fabrics.

Recent years have seen accelerated prohibition or restriction posed by the international communities on the use of disposable plastic products. Compared with synthetic fibers, viscose featuring degradability and flushability can solve plastic pollution brought by disposable wipe products, and resolve the environmental risks due to large numbers of disposable consumer goods that are abandoned and hard to recycle. Therefore, it's expected that the demand for viscose fibers will increase in non-woven fabrics market.

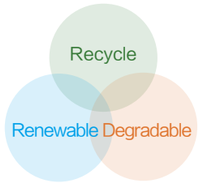


In 2019, the EU issued a ban on disposable plastics , stipulating that disposable plastics under the category of wipes (including personal care wipes and household wipes) should be included in the scope of Article 7 "Marking" and Article 8 "Extended Producer Responsibility". Specifically, the enterprises should provide consumers with clear and visible messages indicating products' plastic content and plastic waste disposal guidelines. Furthermore, bear the transportation and disposal costs of waste as the requirements of the extended producer responsibilities.

China is also enhancing its efforts in plastic pollution control. In January 2020, the National Development and Reform Commission (NDRC) and the Ministry of Ecology and Environment of the People's Republic of China (MEE) issued the Opinions on Further Strengthening the Control of Plastic Pollution (hereinafter referred to as the opinions), putting forward the requirements to establish a sound long-term management mechanism for plastic products, posing prohibitions and restrictions on the production, sales and use of some plastic products in an orderly manner, and actively promote alternative products that are easily recyclable and degradable. The Opinions focus on the control of non-degradable plastic packaging materials such as disposable plastic bags and express plastic packaging. Degradable non-woven fabrics can be used as an important alternative to non-degradable plastic packaging materials.



1.See details in the Directive of the EU on the Reduction of the Impact of Certain Plastic Products on the Environment https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1586747627989&uri=CELEX:32019L0904
2.H&M Group, H&M Group Sustainability Performance Report 2019

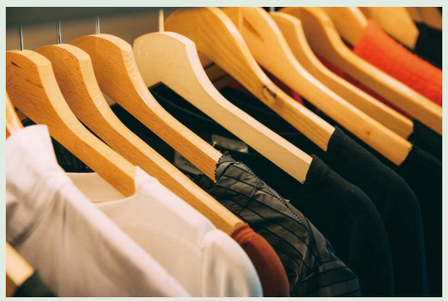


(2) Global demands for sustainable fiber

To acclimate the sustainable development trends and meet consumers' demands for sustainable textiles, global brands have extended their sustainable development strategy to source from sustainable raw materials, and set ambitious goals to substitute all or most of the "unsustainable raw materials" in next 5 - 10 years, and gradually transform the supply chain to recyclable, renewable, and degradable sustainable fibers. MMCF is derived from natural cellulose, made from renewable raw materials and produces degradable products, has gradually become a focus of the sustainable procurement of raw materials. As the main product of MMCF, viscose staple fiber producers should take the responsibility and obligation to lead the transformation and upgrading of "sustainable man-made cellulose fiber".

Development strategies for some international brands of sustainable raw materials

The Swedish clothing brand --H&M Group committed to using 100% recycled or other sustainable materials by 2030, including recycled fibers[2];
The Spanish brand -- Inditex Group (the parent company of Zara) plans to make raw materials 100% sustainable by 2025, i.e., all raw materials source from organic, sustainable or recyclable cotton, linen, and polyester fibers[3];
The British brand -- Burberry plans to substitute all plastic packaging involved in the brand with reusable, recyclable or compostable materials, and completely eliminate the use of common plastic materials by 2025[4];
The German sports brand — Adidas promises to only use recycled polyester materials in all its shoes and clothes by 2024[5].



Towards sustainability: core sustainability challenges facing the viscose industry

Responsible Sourcing: Dissolving pulp extract from woods is the main raw material of viscose. According to incomplete statistics, the main producers of dissolving pulp in the world are Indonesia, Russia, the United States, Canada, South Africa, Brazil, etc. As the development levels and national policies vary in different countries, their degree of protection to forests is also different. To strengthen the protection of forests on a global scale and ensure the sustainable use of forest resources, many forest certification organizations such as FSC, PEFC, and SFI have emerged, and carried out forest certifications in accordance with respective rules. Moreover, in recent years, more and more clothing brands have responded to the initiative of Canopy, a Canadian non-governmental organization, to protect virgin and endangered forests, which puts forward new requirements for the sustainability of raw materials in viscose industry.
Responsible Production: The production process of viscose fiber has developed over a century. As a traditional industry, the production requires the use of energy and water as well as chemicals such as CS_2, NaOH, H_2SO_4. Its production process is accompanied by the discharge of wastewater and air emission containing sulfur. The keys to responsible production and sustainable industrial transformation is improving the recycle rate of chemicals and reducing chemical consumption; reducing the consumption of energy and water resources; minimize the air emission and wastewater discharge. Moreover, implement closed loop production and enhance circular economy system.

3.Inditex,https://www.inditex.cn/en/our-commitment-to-the-environment.
4.Ellen MacArthur Foundation, The New Plastics Economy Global Commitment 2019 Progress Report, https://www.newplasticseconomy.org/about/publications/global-commitment-2019-progress-report.
5.Adidas, https://www.adidas-group.com/en/sustainability/managing-sustainability/environmental-approach/.

(3) Sustainable development: A new growth driver for the industry

In 2019, amid the global economic downturn and weak GDP growth, the textile and apparel industry was growing slowly, while large-scale brands showed a declining growth trend. The global fashion industry is currently seeking transformation, enhancing development resilience and exploring new growth drivers. China is the world's largest viscose fiber producer, with an output accounting for two-thirds of the world's viscose fiber. In 2018-2019, hit by the global economic situation, enterprises were running below capacity or even experienced production suspension. The product price per ton fell by 30-40%, pushing the industry into a tough survival dilemma. Improving the industry's sustainable development level, carrying out technology and product innovation as well as responsible procurement and production are not only a response to the external requirements of global sustainable development, but also an important path to increase the industry's added value and promote industrial transformation and enhancement.

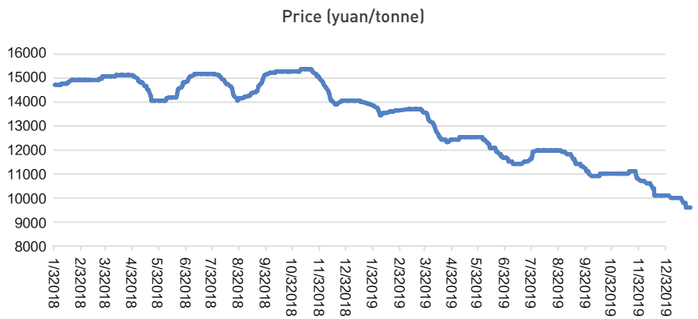


Figure: Price trend of viscose staple fiber in China (2018-2019) [6]

6. www.CCFEI.com

CV's production capacity
330 million tonnes

more than 50% of global total capacity
50%

1.2 Overview of the CV

In 2018, in order to explore sustainable development for viscose industry, echo the concerns and requirements of various stakeholders for sustainable development, and promote joint governance among multiple stakeholders, some viscose producers have spontaneously established Collaboration for Sustainable Development of Viscose (hereinafter: CV). At its inception, the CV has set its purpose and vision that to forge a public governance platform for sustainable development featuring peers supervision and reciprocal promotion based on conditions of the industry, and explore the sustainability model with strong applicability and operability to minimize the environmental and social impacts of viscose products throughout their life cycle.

(1) About CV members and industrial chain members

As of December 31, 2019, CV has a total of 12 members[7] (including two industry associations and 10 viscose producers), and 163 industrial chain members (downstream enterprises). As of December 2019, CV's viscose production capacity exceeded 3.3 million tonnes, accounting for more than 50% of the global total capacity.

Industry associations

1. China Chemical Fibers Association (CCFA)
2. China Cotton Textile Association (CCTA)

Viscose producers

1. Tangshan Sanyou Group Co., Ltd. (Tangshan Sanyou)
2. Sateri Group (Sateri)[8]
3. Xinjiang Zhongtai Textile Group Co., Ltd. (Zhongtai Textile)
4. Yibin Grace Group Co., Ltd. (Grace)
5. Shandong Yamei Technology Co., Ltd. (Yamei Technology)
6. Jilin Chemical Fiber Refco Group Co.,Ltd. (Jilin Chemical Fiber)
7. Shandong Silverhawk Chemical Fiber Co.,Ltd.(Shandong Silverhawk)
8. Xinxiang Chemical Fiber Group Co., Ltd. (Xinxiang Chemical Fiber)
9. Funing Aoyang Technology Co., Ltd. (Aoyang Technology)
10. CHTC Helon (Weifang) New Materials Co., Ltd. (CHTC Helon)

Industrial Association		Viscose Manufacturer				
CCFA	CCTA	Tangshan Sanyou	Sateri	Zhongtai Textile	Grace	Yamei Technology
		Jilin Chemical Fiber	Shandong Silverhawk	Xinxiang Chemical Fiber	Aoyang Technology	CHTC Helon

7.In 2019, Zhejiang Fulida Co., Ltd. (Zhejiang Fulida) left CV due to a halt in production, and Lenzing (Nanjing) Fiber Co., Ltd. (Lenzing [Nanjing]) left due to internal strategic adjustments.
8.Including Sateri (Fujian) Fiber Co., Ltd., Sateri (Jiangxi) Chemical Fiber Co., Ltd. and Sateri (Jiujiang) Fiber Co., Ltd.

Members of the industrial chain

In order to promote the cooperation of upstream and downstream industries and reduce the environmental impact of viscose fiber throughout its life cycle, CV launched an initiative for responsible viscose industry chain in 2019, i.e. "Committing Responsibility to Nature: From Wood to Fashion". Up to now, 163 downstream textile enterprises have committed to this initiative and formally became members of the CV industrial chain. See Appendix II for the list of CV industrial chain members).

Figure: Distribution of the factories of CV member enterprises

Notes: The marks in the figure don't represent all of the factory locations of the Group. Pursuant to the access requirements of CV (see 1.2 (2) for details of CV's organizational structure and access mechanism), some groups and companies only have certain factories of which the output is included in the CV capacity.

(2) CV’s organizational structure and access mechanism

CV has set up a Council and a Secretariat, as the decision-making body for sustainable development. In this Council, Tangshan Sanyou serves as the Chair, Sateri as the Vice Chair, and other members as directors. CCFA assumes the responsibilities of the Secretariat, and takes charge of daily organization and operation of CV, including the formulation of sustainable development strategies and action plans, performance assessment on CV members, and the formulation of development plans.

CV implements the access mechanism for its members. An enterprise that intends to join the CV must pass a review by China Ministry of Industry and Information based on Viscose Fiber Industry Normative Management Requirements, Or reach the same level after examination and verification. At present, all CV members have passed the review.

(3) CV Roadmap and Three-year Action Plan

At its inception, guided by the principle of SDG 12 Responsible Consumption and Production of the UN 2030 Agenda for Sustainable Development, CV has identified the key issues of sustainable development at three main links in the life cycle of viscose products (raw materials, production process, and products) based on major environmental and social impacts of production, operation activities of viscose producers and the opinions of key stakeholders (including governments, research institutions, upstream suppliers, peer companies, end brands, and environmental NGOs). CV also create the Roadmap (referred to as “CV Roadmap”) to evaluate the sustainable development level of CV members, improve CV sustainability performance, and guide the industry in terms of responsible production and sustainable development.

In September 2018, CV released the Three-Year Action Plan for the Green Development of the Viscose Industry (2018-2020) (“Three-Year Action Plan”) to guide the implementation of the CV Roadmap and the improvement of the sustainability performance of CV members through establishing and promoting the operation of CV’s Industry Information Publishing Platform, Green Industrial Chain Sharing Platform, Sustainable Development Management Platform and Advanced Technology Promotion Platform.

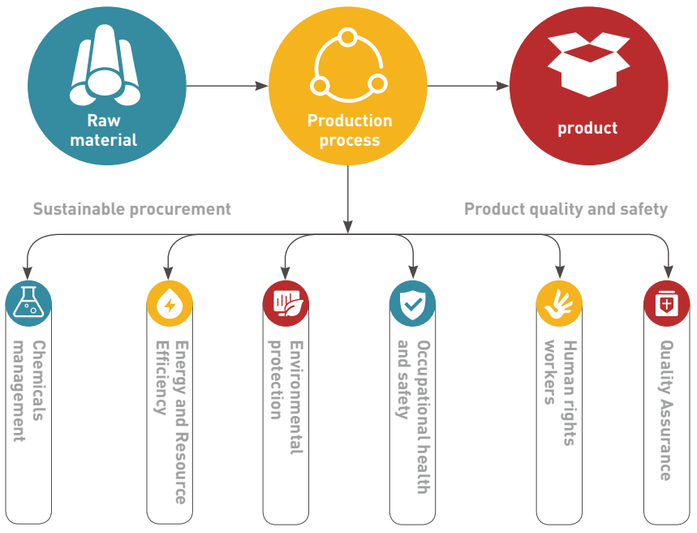


Figure: CV’s key sustainable development issues

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
Raw Material — PEFC or FSC	√	√	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
Raw Material — Pulp purchased from legal sources and with legitimate permits	√	√	Legal compliance	Legal compliance
Manufacturing — Viscose Fiber Industry Rules (2017)	√	√	Full compliance	Full compliance
Manufacturing — Cleaner Production Assessment Standard for Man-made Cellulous Fibers (Viscose) Manufacturing	√	√	Achieve domestic basic level	Achieve domestic advanced, or international advanced level
Manufacturing — 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
Manufacturing — 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.**
Manufacturing — Higg Index	√	√	Complete a Higg FEM 3.0 self assessment	
Manufacturing — BSCI or	√	√	-----	
product — OEKO-TEX® STANDARD 100		√	Obtain certification	Obtain certification
product — GB/T 14463 Viscose staple fiber	√	√	Conformance to standards	Conformance to standards

Figure: CV Roadmap

The CV Roadmap quantifies the evaluation method and assessment progress of sustainability, and formulates an assessment plan by stages. According to the plan, during 18 months from January 2018 to June 2019, CV members had to meet preliminary requirements of the Roadmap (i.e. the first-stage sustainability goals); during the next 18 months from July 2019 to December 2020, CV members will have to meet the high-level requirements of the Roadmap in line with the standards at a higher level (i.e. second-stage sustainability goals).

(4) Overview of CV’s sustainable management progress in 2019

2019 marks the second year of the establishment of CV. The CV, by relying on the promotion and construction of four platforms, has carried out series of work on information disclosure and transparency, multi-stakeholder communication, advanced technology communication and exchange, as well as the continuous improvement of the sustainable governance mechanism. As of December 30, 2019, the CV has made the following progress in its sustainable governance:

01 It has established a mechanism for regular communication and experience sharing, increasing the enterprises’ participation enthusiasm and helping them gain a clearer understanding of the importance of sustainable development and its implementation.

02 Eight CV members have achieved the first stage sustainability goals set by the CV Roadmap. The average level of CV’s key sustainability performance has met the second stage sustainability goals set by the CV Roadmap. [9]

03 A sustainable development industrial chain covering upstream and downstream enterprises has been established, attracting 163 textile enterprises on the downstream and expanding the scope of sustainable governance.

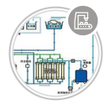
04 The information transparency has been improved, and active communications have been made with third-party international organizations and environmental agencies regarding the status and planning of industry governance. The demands and suggestions of all parties are taken into account, and the industry’s diverse governance structure is further consolidated.

05 Activities have been organized in practice to increase the awareness of sustainable design, and promote the development of sustainable production and consumption solutions at the source.


Industry Information Publishing


Green Industry Chain Sharing


Sustainable Development Management


Energy Saving and Emission Reduction Technology

9.Key sustainable performance indicators specifically refer to energy consumption per tonne of product, fresh water consumption per tonne of product, and CS2 recovery rate. See Chapter 3.3 for details.

Chapter II

Sustainable Governance Practices of CV in 2019

2.1 Industry Information Communication

2.2 Green Industrial Chain Sharing

2.3 Sustainable Development Management

2.4 Advanced Technology Promotion

2.1 Industry Information Communication

(1) Mechanism of internal communication and exchange

Regularly publish newsletters; convene internal working groups meetings; track and share the industry's latest environmental policy requirements, the best environmental and social practices within the industry, and CV's sustainable governance progress; promote communication within CV members; improve member enterprises' awareness of sustainable development and their knowledge of the latest foreign policies and trends; and propel research on common issues encountered in the industry, while making exchanges on relevant experience.

(2) Release of the annual sustainability report

Release CV sustainability report annually; make positive responses to hot topics concerning global stakeholders; and improve the transparency of the industry.
CV's first Sustainability Report was released in March 2019, provides a detailed description of its sustainable governance mechanism, as well as the current status of sustainable development and future plans of CV members, which covering nine core indicators in three dimensions, society, economy, and environment. It also presents key environmental performances of viscose industry, including energy consumption, water consumption, and CS_2 recovery rate.

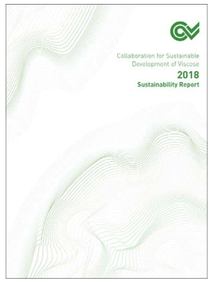


Figure: Access Channels for CV's First Sustainability Report

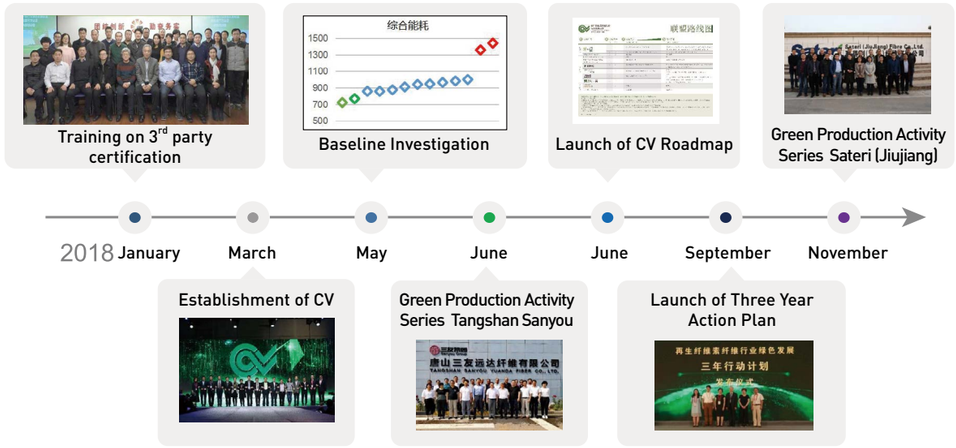


Figure: CV milestones in 2018

10.The Collaboration for Sustainable Development of Viscose 2018 Sustainability Report available at: www.cvroadmap.com/

(3) Multi-stakeholder communication and exchange

Categorized by the purposes and raw material sources of viscose fiber, CV’s major stakeholders include the government regulator, raw materials supplier, downstream spinning enterprises, brands, corporate employees, media, and non-governmental environmental protection organizations. In 2019, CV organized four face-to-face dialogues among multiple stakeholders, including pulp suppliers, downstream spinning enterprises, and brand representatives, with the aims of understanding the concerns and expectations of all parties, gradually addressing the issue of non-transparent information communication, and fostering joint governance among stakeholders.

In January 2019, Dialogues between multiple stakeholders was held in Beijing, gathering nearly 120 representatives from viscose production enterprises, pulp enterprises, cotton textile enterprises, retailing brands, and non-governmental organizations to participate in discussions on sustainable procurement, responsible production, and other concerned sustainability topics within the viscose fiber industry.

In June 2019, CV organized a communication meeting in the yarn industry chain, inviting the spinning enterprises (including Yinshilai and Hengfeng) to share their experience in development of yarn and textile products with viscose, and to explore the innovations in product development in the spinning and weaving process as well as key improvement points.

In June 2019, Exchange Meeting between CV Members & ZDHC Signatory Brands was held in Shanghai, attended by more than 40 representatives from CV members, CV members in industrial chain and ZDHC signatory brands such as H&M, Esprit, Inditex, Lining, Primark, Puma and Target. The participants conducted discussions on such issues as how to manage chemicals in the viscose industry in a sustainable way and how to strengthen cooperation between CV and ZDHC. Since then, CV and CV members deeply participated in the ZDHC MMCF Guideline project.

On December 13, 2019, CV and Brands Dialogue Conference hold in Shanghai. The meeting organized by CV and MMCF Brand Round Table Group. CV and Tesco, H&M, M&S, Esprit, Inditex and other retailing brands discuss how to strengthen collaboration on fiber production and consumption, how to achieve 100% sustainability of viscose, and how to improve the environmental performance of the textile industry chain. Multiple CV members promised to fill in relevant questionnaires for the MMCF Brand Round Table Group and strengthen cooperation.

CV’s key sustainability issues agreed by stakeholders

Responsible procurement of wood pulp: Ensure to purchase dissolving wood pulp from pulp producers with sustainable forestry practice and certification
Responsible production: Chemical recovery and reuse efficiency, energy intensity, greenhouse gas emissions, and management of waste gas, wastewater and solid waste
Product innovation: sustainable raw materials as a substitution, and differentiated product categories
Traceability and information transparency within the industrial chain

In 2019, CV deepened its communication with international non-governmental organizations including ZDHC, Canopy, Textile Exchange, Partnership for Sustainable Textiles, Forum for the Future, Bluesign, Changing Markets Foundation, Institute of Public & Environmental Affairs (IPE), and other global stakeholders, to disclose the sustainable development progress, reflect actual problems encountered by the industry in implementation of the Roadmap standard certification system, and promote the participation of all parties in its sustainable governance and work towards closed loop production.

2.2 Green Industrial Chain Sharing

(1) Committing Responsibility to Nature: From Wood to Fashion

In 2019, CV enhanced its efforts to promote upstream and downstream enterprises to align the initiatives for responsible viscose industry chain, namely “Committing Responsibility to Nature: From Wood to Fashion”. Retailing brands will transmit the pressure through their supply chain management, which is the traditional force of driving the sustainable textile and apparel industrial chain. However, the restriction by the multi-level complexity supply chain and insufficient information transparency, brands does not have enough understanding about the reality of the supply chain, as well as limited engagement with and promotion of the suppliers at a deeper level. Viscose fiber as raw materials is the forefront of textile and apparel industry. The cooperation between enterprises in upstream and downstream industrial chain and retailing brands is beneficial to build a more sustainable and transparent industrial chain from the beginning and minimizing the environmental impacts of viscose fiber throughout its life cycle.
Up to now, CV has approached pulp suppliers, textile enterprises, apparel retailers and brands to discuss how to promote the initiatives for a responsible industrial chain. A total of 163 textile enterprises (see Appendix II for the list) have embraced the initiative of “Committing Responsibility to Nature: From Wood to Fashion”, and formally became members of the CV industrial chain.

(2) Improving the awareness and practice of sustainable textile design

Unlike traditional design, sustainable design takes into account the potential resource consumptions and environmental impacts of a product along its life cycle from product's development and design stage for the purpose of minimizing the product's impacts on resources and environment throughout its life cycle.

To disseminate the concept of sustainable design, CV launched the "CV Sustainable Textile Creative Design Competition" in November 2019. With "Future" as the theme and upholding the concepts of ecology, greenness, environmental protection and sustainable development, the competition solicited works from teachers and students at art design institutes or workshop, as well as from designers, studios and design enthusiasts. CV also organized series of promotion activities in several universities, including the Beijing Institute of Fashion Technology to share with students and designers the sustainable design concept and the impact of sustainable fiber selection on the product's life cycle, and encourage talented young designers to address sustainable design. As of December 2019, the Organizing Committee of the "CV Sustainable Textile Creative Design Competition" had received a total of 302 entries.

Figure: CV Sustainable Textile Creative Design Competition and award-winning work

2.3 Sustainable Development Management

Continuous improvement and multi-stakeholder engagement are the core principles advocated by the CV Roadmap. The current Roadmap was initially formulated based on the status quo of the industry, major concerns of the stakeholders, and the development level of selected standards. In 2019, to address the practical challenges faced in the implementation of the Roadmap, CV referred to the suggestions from the stakeholders and took a series of measures to improve its sustainable management model based on the current roadmap.

(1) Unified statistics and evaluation methods of key performance indicators

How to evaluate the sustainable development performance of CV members is the core of CV sustainable management. In 2018, CV carried out a survey on sustainable development of different enterprises, finding that data from different enterprises are incomparable due to inconsistent alignment in statistical scopes, statistical standards and calculation methods among enterprises. In 2019, CV comprehensively analyzed the accessibility and development trend of production equipment and technologies in the industry, evaluated and compared the industry-related indicators set in relevant domestic and foreign standards. Based on this, the Scope and Calculation Methods of Key Performance Indicators for Sustainable Viscose Staple Fiber Production was established to specify the definition, statistical scope and calculation method of three key indicators involved in the CV production process and related to resource consumption and environmental pollution namely, the comprehensive energy consumption per unit of products, fresh water consumption per unit of products and CS_2 recovery rate. Moreover, to quantify the sustainable development performance and advanced level of enterprises, this document put forward the indicator requirements to be met by enterprises within the prescribed period. The Scope and Calculation Methods of Key Performance Indicators for Sustainable Viscose Staple Fiber Productionwill be released as a group standard and is currently at the consultation stage and being implemented on a trial basis internally. When inputting their sustainability report data, all enterprises can refer to this standard, which will be officially released by CV in 2020.

The statistical scope and indicators of this standard refers to Clean Production Standard for Man-made Cellulose Fiber Manufacturing (Viscose) (CPS), the government's emission standards of various countries and third-party documents such as EU-BAT (production of polymers) and Eco-label criteria. During the preparation of these Standards, CV also sought recommendations from various stakeholders, including retail brands and third-party standards bodies. When determining the calculation methods and indicators of the CS_2 recovery rate, CV actively communicated and reached an agreement with ZDHC – a global multi-stakeholder initiative, which is conducive to unifying and coordinating the sustainability requirements for global MMCF.

Table Key Performance Indicators for Sustainable Viscose Staple Fiber Production in 2025 (Trial) [11]

SN	Standard item	Unit	Advance	Base
1	Energy consumption per tonne of product[12]	kgce/t	⩽ 850	⩽ 900
		GJ/t	⩽ 24.9	⩽ 26.38
2	Fresh water consumption per tonne of product	m^3/t	⩽ 42	⩽ 45
3	CS_2 recovery rate	%	⩾ 95	⩾ 92

Notes: The requirements of Base value are same as those of Level I (the highest level / international leading level) of the cleaner production indicator system (CPS)

11.Source: Scope and Calculation Methods of Key Performance Indicators for Sustainable Viscose Staple Fiber Production (Draft for Comment)
12.The conversion of the energy consumption per tonne of product is subject to the standard fiber fineness of 1.67dtex. The comprehensive energy consumption is calculated according to the General Principles for Calculation of the Comprehensive Energy Consumption (GB/T 2589-2008).

How to control sulfur emission into the air

Given that exhaust gas (air emission) containing sulfur is the core environmental challenge in viscose fiber production, CV reviewed relevant global standards for MMCF, and compared different restrictions when developing these standards.

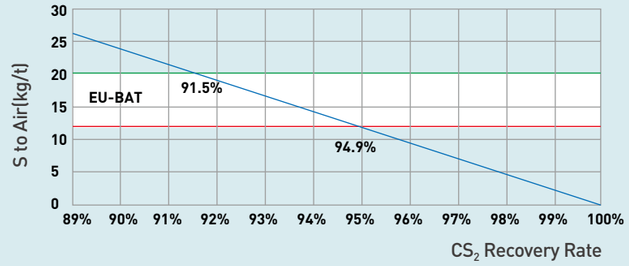
SN	Requirements	Advantages	Disadvantages	Representative standards
1	CS_2 recovery rate	Cover all potential discharge points (emission from point source/fugitive emission) Easy to calculate and make statistics and horizontal comparison of the factory Reflect the technical level of the factory directly	No direct disclosure of emissions	CPS ZDHC MMCF guide
2	S to air (Sulfur Emission per tonne of product)	Reflect the technical level of the factory directly Reflect the environmental impact per product unit directly	The statistics and calculation methods are inconsistent. Difficult to calculate it directly. The emissions need to be calculated after calculating the recovery rate	EU BAT Eco-label

Formula for converting the CS_2 recovery rate and sulfur to air:

Sulfur to air (kg/t) ≈ CS_2 consumption per unit of products[13] × Content ratio[14] of S element in CS_2 × (1-CS_2 recovery rate)

Estimation formula:

S to Air=280×84.21%×（1-CS_2 recovery rate）



Upon calculation, the CS_2 recovery rate corresponding to the S to Air（12-20kg/t）in the EU-BAT norms is about 91.5-94.9%.

(2) Engagement in the development of third-party standard certification system

As the core of CV evaluation standard--cleaner production indicators' roadmap requires its members to continuously improve own sustainability performance through their series of "raw materials–production–product" certifications. To improve the operability and applicability of the certifications, CV took the initiative to communicate with various certification agencies, organizers, and sponsors in 2019. It is to identify the actual problems encountered in the certification process of CV standards and mobilize their active participation in the development, revision and improvement of the standards specific to industry. Main cooperation includes:

ZDHC

In 2019, CV cooperated with ZDHC in formulating the ZDHC MMCF guideline, which was officially released in April 2020[15].

Textile Exchange / Forum for the Future

CV made extensive exchanges with Textile Exchange and Forum for the Future on the future direction of the industry's sustainable development, and participated in its Net Positive MMCF project.

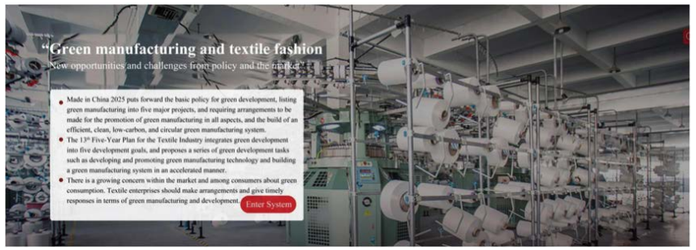
Partnership for Sustainable Textiles

CV communicated with the Partnership for Sustainable Future about international Textiles that can be used as a reference when determining key issues of the industry's sustainable development.

13.The enterprises consumption of CS_2 per unit of products vary a little, at about 280kg/t.
14.The content ratio of S element in CS_2 is 84.21%.
15.Release channel: https://www.roadmaptozero.com

(3) Development of an online data management system

To promote the standardization, visualization, and normalization of data management by CV members, CV cooperated with the CNTAC in 2019 to establish an online data management system for sustainable development of viscose industry, which it is based on the consumer goods (textile and apparel) manufacture information evaluation system developed by the CNTAC.[16]
With the general principles for the Assessment of Green Factories (GB/T 36132-2018) issued by the Ministry of Industry and Information Technology as its basis, this system takes full account of the key economic, social, and environmental indicators of the viscose industry, and integrates the requirements conveyed through the questionnaires among brand parties and international institutions. The system can use as the digital management of the sustainable performance of CV members, facilitate data collection, storage and horizontal comparison, and provide support for data and information management within CV and its enterprises.



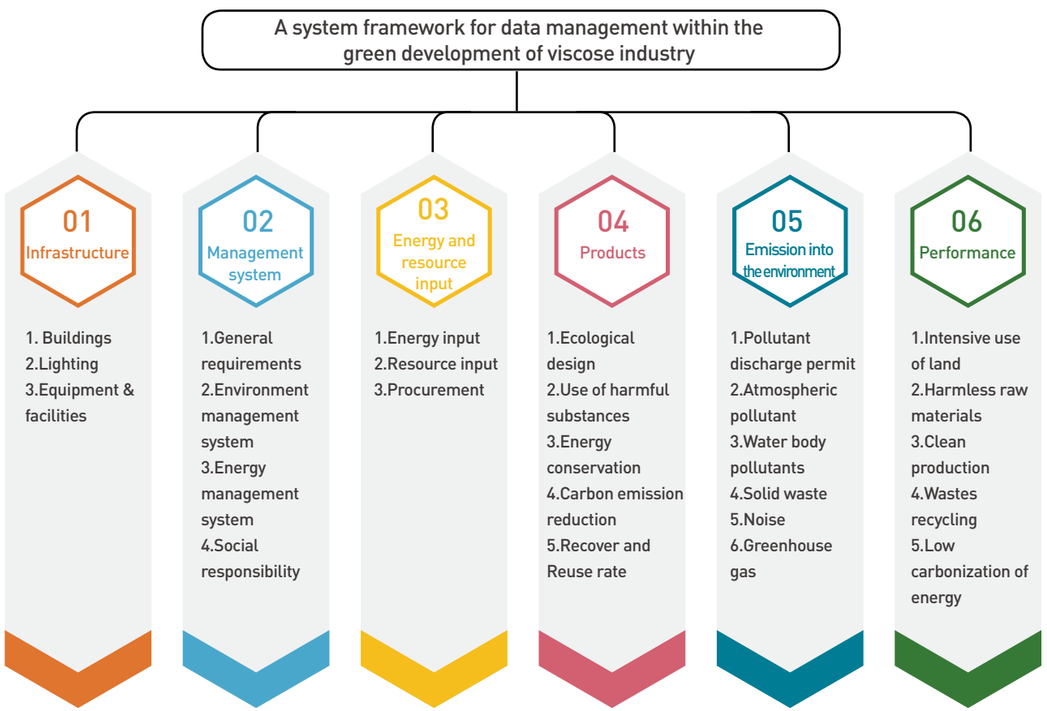


Figure: A system framework for data management within the green development of viscose industry

16.The information evaluation system for the manufacturing of consumer goods (textile and apparel): http://green.texsmc.org/ Notice from the China Chemical Fibers Association on organizing activities to promote energy saving and emission reduction technologies across the chemical fiber industry: http://www.ccfa.com.cn/site/content/7933.html

2.4 Advanced Technology Promotion

(1) Exchange and promote industry's most advanced technologies

Promotion of the industry's most advanced technologies and equipment

To improve CV's sustainable performance, it's necessary to develop and update the advanced technologies and equipment. To this end, CV established the Technology Committee for Industrial Sustainable Development, and formulated the Recommended Catalogue of Technical Equipment for Industrial Green Development, in the bid to promote the identification and application of the best environmental practices and feasible techniques across the viscose industry. It also issued the first batch of technical equipment targets in its three-year action plan, covering a total of 15 technologies, including skills, water saving, consumption reduction, and waste disposal.
Every year, CV will, by relying on the China Chemical Fibers Association , encourage enterprises to apply for advanced energy-saving and emission-reduction technologies, and invite experts to review their advancement and feasibility. The technologies and equipment upon approval will be promoted across the industry. In 2019, the member enterprises such as Yamei Technology and Zhongtai Textile submitted the application for advanced technologies and equipment that are used in the treatment of waste gas and water. See Chapter 4.3 for details on Yamei Technology's refrigeration technology through the utilization of wastewater and heat, and Zhongtai Textile's biochemical waste gas treatment technology with high-density bacteria arrays.

Exchanges on advanced technologies and equipment among enterprises

To promote technology exchanges and sharing among enterprises, CV launched the "Green Production Series Activities" in 2019, during which many visits, exchanges, and training sessions were organized.
In June 2019, CV members visited Yamei Technology to learn about its energy saving and emission reduction measures and its achievements. Also, investigate its drying workshop, information control room and factories onsite.
In August 2019, CV members visited Zhongtai Textile, where the representatives explained the latest energy-saving and emission reduction technologies in the past two years, including acid station desalination; boiler flue gas desulfurization; carbon disulfide recovery and reuse, alkali cellulose recovery and hemicellulose extraction, advanced wastewater treatment. Construction of new sludge dewatering rooms, reverse osmosis desalination of wastewater and other comprehensive treatment projects.

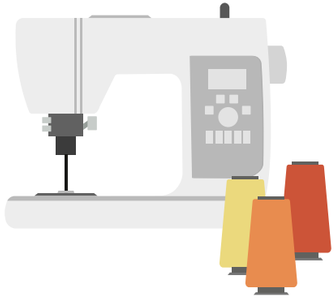
17. Notice from the China Chemical Fibers Association on organizing activities to promote energy saving and emission reduction technologies across the chemical fiber industry: http://www.ccfa.com.cn/site/content/7933.html

Promotion of energy-saving and emission reduction technologies

As part of the “Green Production Activities at Zhongtai Textile”, Haldor Topsoe was invited to explain the new Particle Oxidation Catalyst (POC) technologies used in the treatment of the offgas from viscose process. This technology enables selective treatment of various kinds of sulfides, and can effectively remove hydrogen sulfide while retaining valuable carbon disulfide to be reused in viscose fiber production.

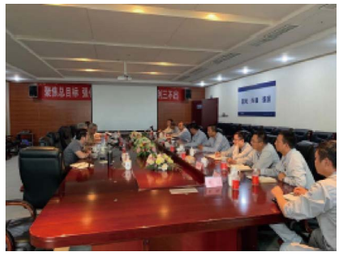
Figure: Green Production Activities at Yamei Technology

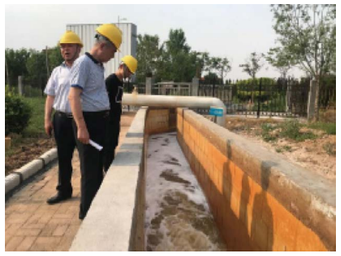
Figure: Green Production Activities at Zhongtai Textile



(2) The environmental governance level of the factory and surrounding communities

In 2019, to support enterprises for controlling pollutants and emissions, and showcase the living environments of the members factories and surrounding communities, CV organized a “CV Garden Factory” selections. The expert group established by the CV Secretariat visited the factories of various enterprises to evaluate conditions of their greening, sewage outfalls, sewage treatment, main sewage outlets, chemical warehouses and workshop hygiene, and learn about the real implementation progress of the Roadmap by all enterprises. Upon evaluation, five factories were granted the title of “CV Garden Factory”.





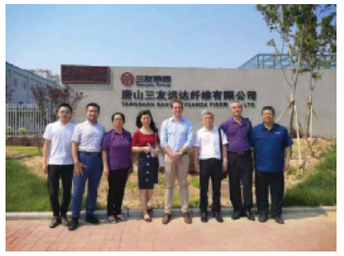
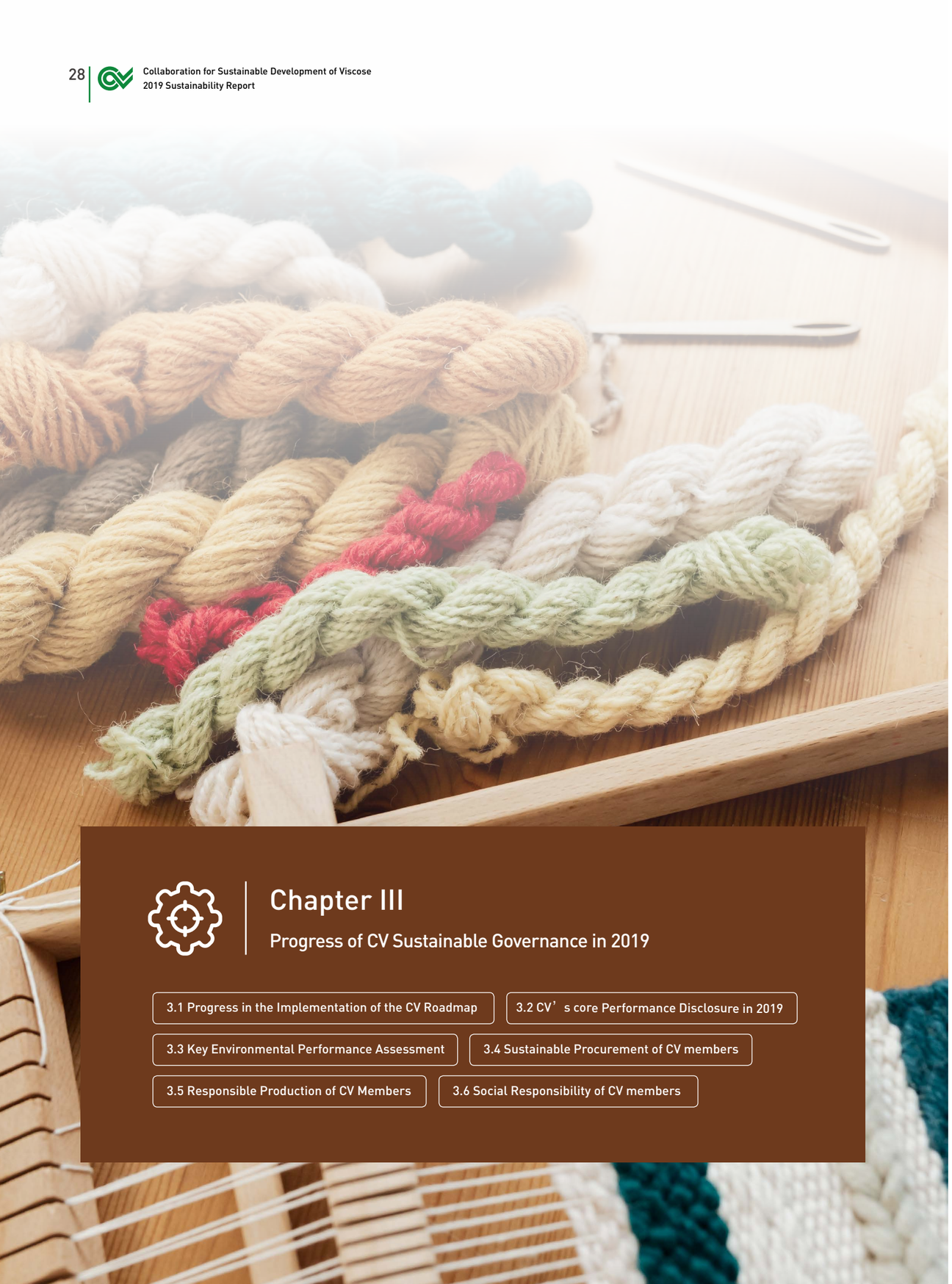


Figure: “CV Garden Factory” enterprise evaluation, inspection and selection of the sites

Enterprises winning the “CV Garden Factory” title granted by CV in 2019

Xinjiang Zhongtai Textile Group Co., Ltd.	Tangshan Sanyou Group Xingda Chemical Fiber Co., Ltd.	Sateri (Fujian) Fiber Co., Ltd.	Shandong Yamei Technology Co., Ltd.	Yibin Grace Group Co., Ltd.



Chapter III

Progress of CV Sustainable Governance in 2019

3.1 Progress in the Implementation of the CV Roadmap

CV members should achieve the sustainability goals set at the first stage by the CV Roadmap by June 2019. In September 2019, CV evaluated whether its members had met the first-stage requirements, with a focus on inspecting the following items:[18]

- Source of raw materials: Get FSC or PEFC certification;
- Production process management: Get OEKO-STeP certification at Level 2 or above or complete HiggFEM3.0[19]self-assessment
- Product safety: Pass Standard 100 by OEKO-TEX® certification

According to the investigation results, eight CV member enterprises have achieved the first-stage sustainability goals set in the Roadmap, and two enterprises failed to meet these goals, which were marked as warning status. If these two enterprises still fail to meet these goals by the end of 2020, CV will expel them in accordance with the CV charter.

CV enterprises that have reached the standard								CV enterprises that failed to reach the standard	
Tangshan Sanyou	Sateri	Yamei Technology	Jilin Chemical Fiber	Grace	Shandong Silverhawk	Xinxiang Chemical Fiber	Zhongtai Textile	Aoyang Technology	CHTC Helon

Table: CV members' progress in the implementation of the Roadmap (as of December 2019)

CV enterprises	Source	Production process	Product safety
Tangshan Sanyou	FSC	OEKO-SteP Level III	OEKO-Standard 100
Sateri (Fujian)	PEFC	OEKO-SteP Level III	OEKO-Standard 100
Sateri (Jiujiang)	PEFC	OEKO-SteP Level III	OEKO-Standard 100
Sateri (Jiangxi)	PEFC	OEKO-SteP Level III	OEKO-Standard 100
Yamei Technology	FSC&PEFC	OEKO-SteP Level III	OEKO-Standard 100
Jilin Chemical Fiber	FSC&PEFC	OEKO-SteP Level III	OEKO-Standard 100
Grace	FSC	OEKO-SteP Level III	OEKO-Standard 100
Shandong Silverhawk	FSC	OEKO-SteP Level II	OEKO-Standard 100
Xinxiang Chemical Fiber	FSC	OEKO-SteP Level III	OEKO-Standard 100
Zhongtai Textile	FSC&PEFC	OEKO-SteP Level III	OEKO-Standard 100
Aoyang Technology	FSC	Not completed yet	OEKO-Standard 100
CHTC Helon	Not completed yet	Not completed yet	OEKO-Standard 100

Notes:

1. Affected by the Xiangshui Explosion in early 2019, Aoyang Technology can't work normally in the first half of 2019, resulting in a delay in relevant work.
2. The CHTC Helon's viscose factory has been closed, while the new factory has not yet been work yet, The enterprise does not have the conditions to complete the certification.

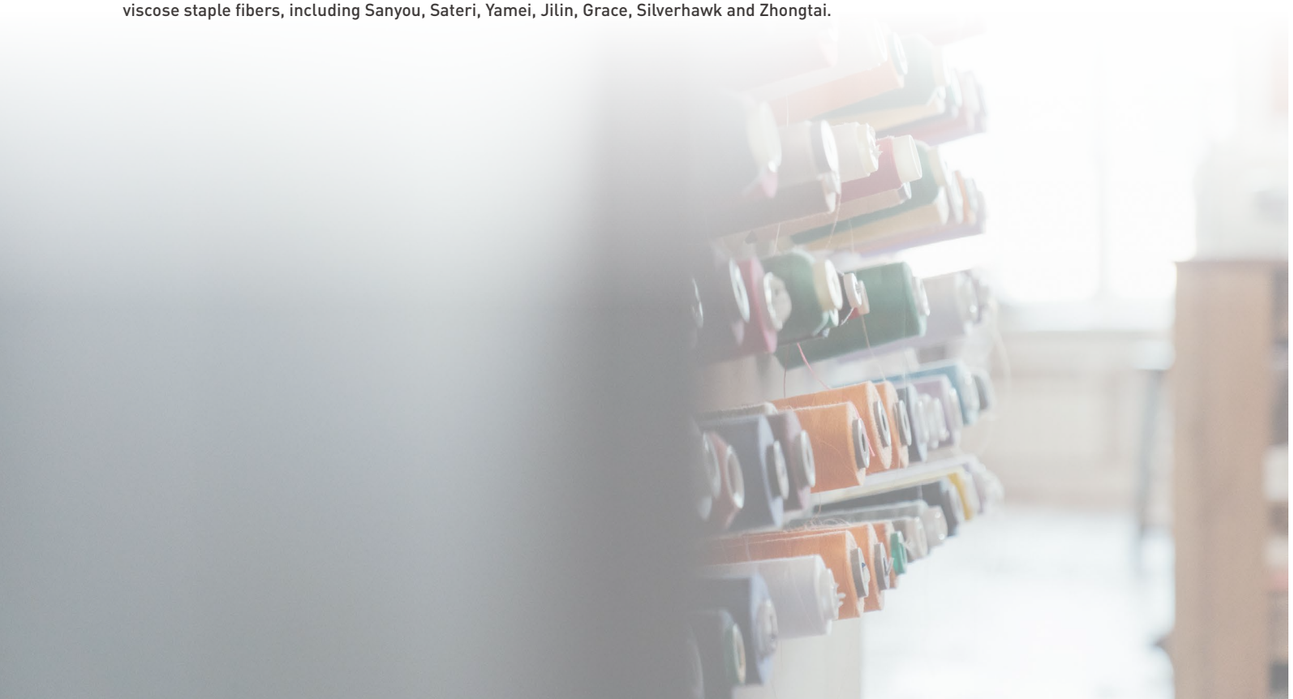
18.The first-stage requirements set in the CV Roadmap also include the ZDHC wastewater treatment guide. However, because ZDHC is working with CV to develop the MMCF wastewater treatment guide, the implementation of the ZDHC wastewater treatment guide has been suspended. After the MMCF version is officially released, CV members will follow the requirements set in the new guide.

19.According to the feedbacks from CV members and stakeholders, the STeP by OEKO-TEX® certification is very similar to Higg FEM 3.0. CV will further solicit opinions from stakeholders to improve the requirements for production process management in CV Roadmap 2025.

3.2 CV’s core Performance Disclosure in 2019

Key Indicators	2019 年
Economic Indicators	
1.Output (million tons)	2.753
2. Annual sales (Million RMB)	26700
Social indicators	
3. Social charity expenditure (Million RMB)	8.7
4. Number of Employees	18947
5. Employee social insurance coverage ratio	100%
Environmental Indicators	
6. Environmental protection expenditure (Million RMB)	697
7. Energy consumption per tonne of product (kgce/t)	868.98
8. Fresh water consumption per tonne of product (m^3/t)	42
9. CS_2 Recovery rate	93%

In 2019, CV members input their sustainability information into the online data management system. CV focused on analyzing the sustainability performance of the first eight members (10 factories in total) that achieved the current phased sustainability goals, and disclosed relevant information. Among them, Xinxiang Chemical Fiber produces viscose filament yarn instead of viscose staple fiber, so its core performance is not included in the statistical scope of this report. Unless stated otherwise, the following analysis of the performance data of “CV members” only covers the first seven enterprises that meet the sustainability goals and mainly produce viscose staple fibers, including Sanyou, Sateri, Yamei, Jilin, Grace, Silverhawk and Zhongtai.



3.3 Key Environmental Performance Assessment

Responsible production is one of the key works implemented by CV to promote sustainable development. According to the requirements of the CV Roadmap, CV provides guidance for its members to improve their performances in line with CPS. It also evaluates the green development level of enterprises’ production reference with the internationally-recognized advanced standard – EU-BAT. The statistical scope and calculation methods of energy consumption per tonne of product, fresh water consumption per tonne of product and CS_2 recovery rate are subject to the Scope and Calculation Methods of Key Performance Indicators for Sustainable Viscose Staple Fiber Production (“Draft for Comment”) was implemented on a trial basis in 2019.

(1) Improvement of key performance in 2018-2019

Compared with the comprehensive performance on key indicators in the production in 2018,[20] the CV’s energy consumption and fresh water consumption per unit of products decreased by 9% and 13% in 2019,[21] while the CS_2 recovery rate increased by 3%. All these demonstrate notable achievements in sustainable governance made by CV.

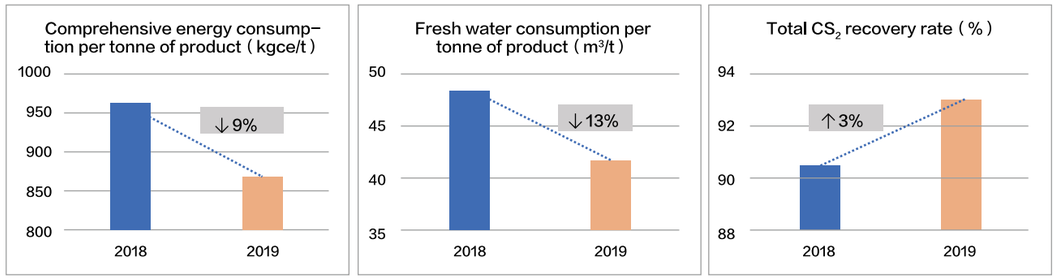


Figure: Improvement of CV’s key environmental performance in 2018-2019

(2) Distribution of the performances of CV members in 2019[22]

In 2018, CV compared CPS with EU-BAT. Judging from comparable data, the core indicators of energy consumption per ton of products, fresh water consumption per ton of products, and CS_2 recovery rate set forth in Level I standard (international leading level) of CPS fall into the recommended ranges of EU-BAT.

SN	Project	Unit	EU Best Available Techniques (EU-BAT)	CV Roadmap		Comparison result
				Indicator value	Source	
1	Energy consumption	GJ/t	20-30	⩽ 26.38GJ[23]	CPS (Level I)	Key indicators are consistent
2	Water consumption	m^3/t	35-70	⩽ 45[24]	CPS (Level I)	Key indicators are consistent
3	Sulfur emitted into the air	kg/t	12-20	⩽ 18.9[25]	CPS (Level I)	Key indicators are consistent

Notes: CV Roadmap versus EU-BAT in terms of core performance indicators

20.To ensure the scientific nature, rationality and comparability of data and the uniformity of the sample range, CV recounted the 2018 baseline data of enterprises in this survey (seven enterprises and nine factories) .
21.The measurement unit of energy consumptionis Kgce (kg of standard coal equivalent), 1 kgce = 29307 KJ. See General Principles for the Calculation of Comprehensive Energy Consumption (GB/T 2589-2008) for details.
22.The data is published in accordance with the Level I, II and III requirements of the Cleaner Production Indicator System for Man-made Cellulose Fiber Manufacturing as well as the recommended range value of EU-BAT (expressed as a percentage), to illustrate the distribution of enterprises’ performance at different levels.
23.The Level I indicator of the cleaner production standard specifies the “energy consumption ⩽ 900kgce/t” , which is about 26.38GJ/t after conversion.
24.Water consumption under the Cleaner Production Indicator System includes water supply from surface water, underground water, and urban water supply projects as well as the total quantity of other water or water content in aqueous products bought by the enterprise from the market. Cooling water is repeatedly used in the production process, of which the actual consumption is far lower than the recommended range specified by EU-BAT.
25.The Level I indicator of the Cleaner Production Standard System specifies “CS2 recovery rate ⩾ 92%” , which is about 18.9kg/t for sulfur emitted into the air after conversion.

As required by the CV Roadmap, by the end of 2020, CV members must achieve Level II of CPS, and CV's key environmental performance must achieve Level I on average. After comparing CV's average level (arithmetic mean value) in 2019, the indicator range of CPS and EU-BAT, as well as the compliance of all enterprises, it was found that the average level of CV's three key environmental performances (arithmetic mean value) had exceeded Level I benchmark value of the cleaner production system, and fell within the recommended range of EU-BAT. The performance distribution of enterprises varies due to different indicators:

01 All members must reach Level III of CPS.

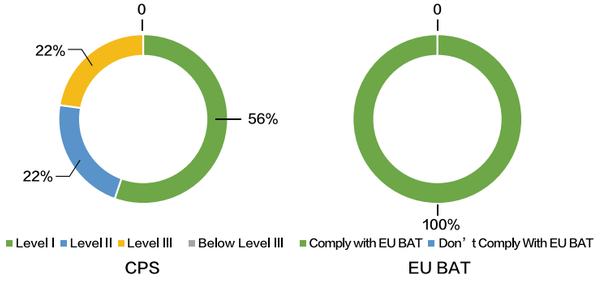
02 Enterprises whose energy consumption per unit of products reached Level I of CPS accounted for 56%, Level II accounted for 78%.

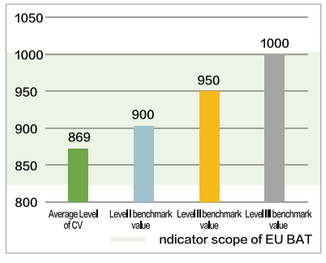
03 Enterprises whose fresh water consumption per unit of products reached Level I of CPS accounted for 56%; Level II accounted for 100%.

04 Enterprises whose CS_2 recovery rate reached Level I of CPS accounted for 78%; Level II accounted for 89%.

05 The energy consumption per unit of products of all enterprises fell within the recommended range of EU-BAT. As in CS_2 recovery rate, 58% of the members meets or exceeds the recommended range of EU BAT. Fresh water consumption per unit of products, 100% of all members meets or exceeds the recommended range of EU BAT.

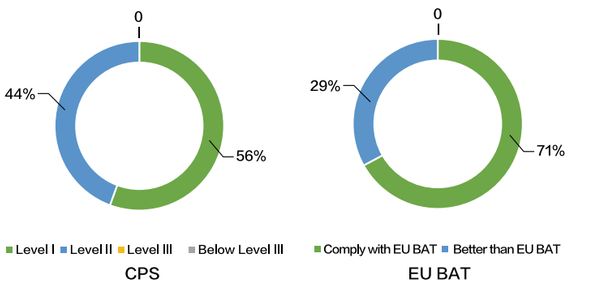
Figure: Distribution of enterprises' performance in e energy consumption per unit of products (kgce/t)

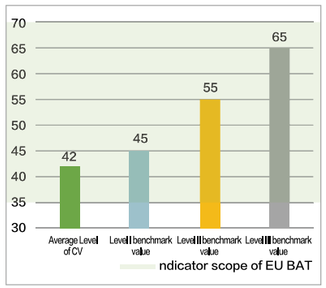




CV's average level of compared with EU BAT and CPS

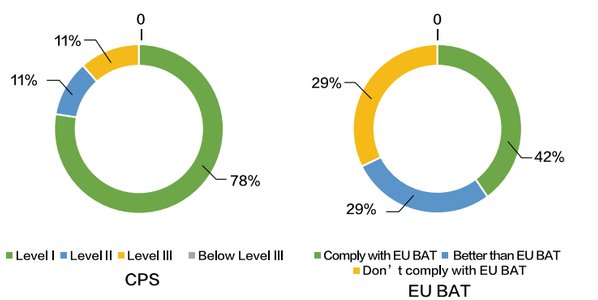
Figure: Distribution of enterprises' performance in fresh water consumption per unit of products (m^3/t)

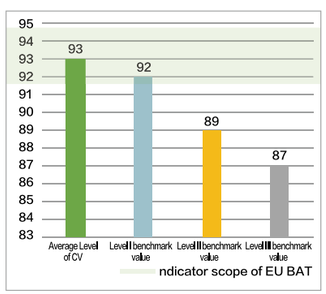




CV's average level of compared with EU BAT and CPS

Figure: Distribution of enterprises' performance in CS_2 recovery rate (%)





CV's average level of compared with EU BAT and CPS

3.4 Sustainable Procurement of CV members

(1) Procurement of dissolving pulp in China's viscose industry

According to data from China Customs, in 2019, the total imports of dissolving pulp by viscose producers in China were 3.06 million tonnes, which is an increase of 7.9% from 2018. Indonesia is the largest source of dissolving pulp, accounting for 24% of the total imports, followed by Brazil, the United States, South Africa, Laos and the Czech Republic.

Country or Region	Total imports (10,000 tonnes)	Proportion (%)
Total	306.34	100%
Indonesia	72.75	23.7%
Brazil	42.3	13.8%
United States	31.67	10.3%
South Africa	30.5	10.0%
Laos	21.38	7.0%
Czech Republic	20.49	6.7%
Canada	15.67	5.1%
Finland	14.5	4.7%
Austria	13.89	4.5%
Sweden	13.03	4.3%
Other countries	30.16	9.8%

Figure: Top 10 source countries from which China purchased dissolving pulp[26]

(2) Current procurement of dissolving pulp by CV

In 2019, CV carried out a survey on the policies, sources, and quantities on its members for procurement of dissolving pulp, establish that dissolving pulp was purchased from more than 20 suppliers in the world (see Appendix III for the supplier list). The total dissolving pulp purchased was about 2.87 million tonnes, and the average consumption per tonne of product was 1.03 tonnes, which conforms to Level III of CPS, and precedes the recommended range of EU-BAT. Pursuant to the requirements of the Roadmap, except CHTC Helon[27], all enterprises have participated in the FSC®/PEFC™ certification; eight enterprises have issued the policy for procurement of dissolving pulp. Five of the enterprises, (Sanyou, Sateri, Xinxiang, Jilin and Grace) have completed independent audits and ensured that their wood is not sourced from ancient and endangered forests.

The global sustainable traceable supply chain system of textile and apparel industry is continuously extending their reach to fiber materials and raw materials at upstream. With the growing awareness of sustainable souring, sustainable sourcing will become an important indicator of future competitiveness. CV members have started to formulate sustainable procurement policies and increase the procurement quantity of pulp certified by a third party. However, members are also facing with multiple challenges. Most dissolving pulp is purchased through international channels, which most channel has a trader in between. It's difficult for members to skip the trader and connect directly with pulp producer and woodland owner. Moreover, pulp manufacturers are unwilling to provide information on certifications, source of fiber and forests to fiber producers (especially those with small orders).Lastly, there are many standards for sustainable forest certification internationally, which vary in their certification conditions. Even same standard's certification parameters may change depends on company's condition, which makes it difficult for enterprises to respond in a timely manner.

To address these challenges, CV is carrying out a research on the global pulp production and marketing, and working with major pulp suppliers and stakeholders to formulate a sustainable pulp procurement policy that contains unified procurement standards and evaluation methods.

26.Source: China Customs
27.CHTC Helon suspended production due to relocation, thus failing to complete the certification.

3.5 Responsible Production of CV Members

(1) Compliance production and pollutant discharge

The basis for sustainable development of enterprises is that their construction, production, and operation conform to relevant environmental and social laws and regulations as well as national and local environmental protection requirements. At present, all CV members have passed the national audit based on Viscose Fiber Industry Standard Conditions (2017 Version)[28] , local government requirements, and discharged wastewater and waste gas as per relevant national laws and standards.

Applicable waste gas emission standards

Emission Standards for Odor Pollutants (GB14554-1993)
Integrated Emission Standard of Air Pollutants (GB16297-1996)
Emission Standard of Air Pollutants for Thermal Power Plants (GB13223-2011)[29]

Applicable wastewater discharge standards

Integrated Wastewater Discharge Standard (GB8978-1996)

In 2018, CV jointly with the Institute of Public & Environmental Affairs (IPE), established a noncompliance supervision mechanism based on finding problems, solving problems and continuous improvement. It is to supervise the compliance emissions of CV members. CV has followed up all violations by its members based on the environmental information and data of IPE's blue map, so as to ensure that the enterprises can promptly disclose relevant issues and make corresponding rectifications.

Data from the blue map in 2019 indicated that three CV members (Sateri, Xinxiang and Yamei) had one violation record respectively. To address this, CV established a three-party communication and coordination mechanism between the involved enterprises --CV--IPE to accelerate the solution for related issues. At present, the issues have been effectively resolved.

IPE 公众环境研究中心 Institute of Public & Environmental Affairs

28.See details of the verification result from the official website of Ministry of Industry and Information Technology of the People's Republic of China http://www.miit.gov.cn/n1146295/n1652858/n1652930/n4509607/c6002965/content.html
29.The groups and companies of CV members have own thermal power plants. (Thermal power plants and CV members are the same legal person or level subsidiary). Since China's thermal power industry has uniform mandatory requirements for green development, CV doesn't set additional sustainable performance requirements for thermal power plants.

(2) Environmental protection input

CV members 'environmental protection expenditure in 2019 was RMB 697 million. The production output of CV's scope fell by 11% from 2018, but the input in environmental protection increased by 27%, showing that the enterprises are increasing their input into improving their green development level and environmental performances.

(3) Recycling water resources

The water sources of enterprises mainly include: surface water (from adjacent lakes), groundwater, municipal water purchased, and sewage reuse. Enterprises reduced the consumption and improved the reuse rate of water resources through continuous improvement of processes and equipment. In 2019, the fresh water consumption per unit of products among CVmembers was 42m^3/t, a decline of 64% and 13% respectively from 2005[30] to 2018. For the utilization level of each enterprise, please refer to the performance distribution figure for CV members.

(4) Consumption and recycling of chemicals

The production of viscose involves the use of various chemicals based on the needs of each production stage. The chemicals are mainly used include caustic soda (NaOH), sulfuric acid (H_2SO_4), carbon disulfide (CS_2), oiling agent and other chemical materials, including titanium dioxide, sodium sulfate (Na_2SO_4), zinc sulfate ($ZnSO_4$), sodium sulfide (Na_2S) and hydrochloric acid (HCl). One of the important measures taken by enterprises to reduce cost, increase efficiency and reduce wastewater and waste gas pollution is to lower the use of chemicals in the production process and improve the chemical efficiency, which is achieved through equipment transformation and upgrading, technological improvement, management innovation and recycling.

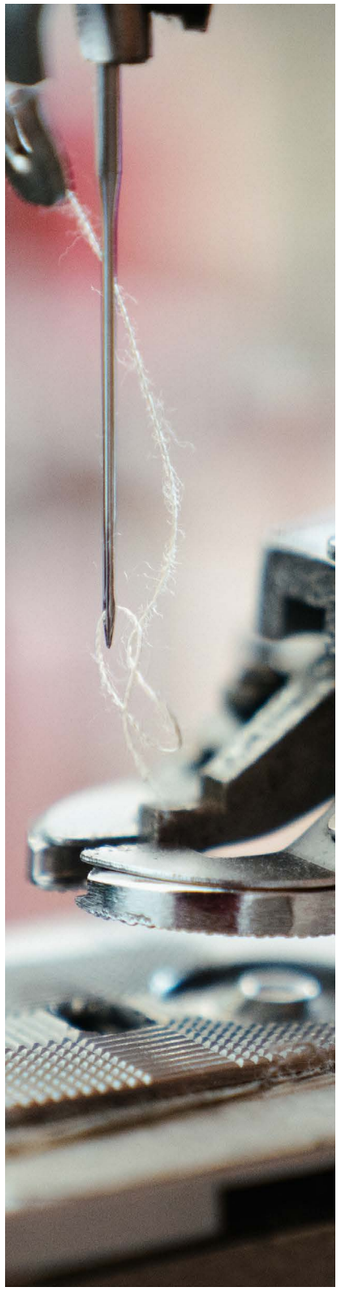
In 2019, CV carried out a survey on the consumption data of three major chemicals in the industry, , NaOH, H_2SO_4 and CS_2. The statistics showed that the average consumption (arithmetic mean value) of NaOH, H_2SO_4 and CS_2 within CV member enterprises was 0.54t/t, 0.68t/t, and 68.34kg/t.

Table: Consumption of main chemicals used by CV in 2019

Chemicals consumption per tonne of product	Average level within CV members	EU-BAT	CPS		
			Level Ⅰ	Level Ⅱ	Level Ⅲ
NaOH (t/t)	0.54	0.4-0.6	⩽ 0.47	⩽ 0.52	⩽ 0.55
H_2SO_4(t/t)	0.68	0.6-1	⩽ 0.72	⩽ 0.75	⩽ 0.80
CS_2 (kg/t)	68.34	80-100	⩽ 80	⩽ 100	⩽ 120

Table: Consumption of main chemicals used by CV in 2019

30.The data for 2005 came from China's Viscose Industry Development and Environmental Protection, representing the industry-wide data in 2005.



CS_2 is currently the main recycled chemical in the industry. The average level of the CS_2 recovery rate of CV members is 93%. For data of each enterprise, please refer to the performance distribution figures of CV members in 2019. The CS_2 and sulfide recycling methods of CV members are CS_2 and H_2S condensation, carbon adsorption or catalytic oxidation and biological treatment. Under the support of CV, ZDHC developed the 2019 MMCF waste gas emission standard, which collected information about enterprises' recycling methods of CS_2 and sulfur-containing substances in waste gas.

01 CS_2 recycled by condensation recovery.

02 CS_2 recycled by activated carbon adsorption.

03 Removal of H_2S as NaHS or Na_2S by alkaline wash and spray.

04 Converted H_2S and CS_2 into H_2SO_4 by conversion into Sulphuric Acid with oxidation.

05 Converted H_2S and CS_2 into SOx by exhaust gas incineration/ boiler followed by scrubbing of flue gases by lime to produce Gypsum.

06 Converted H_2S, CS_2 or both to Sulphur by biological or catalytic processes or redox process.

07 Other ways to convert H_2S and CS_2 to chemicals that can be treated or recycled, such as: carbon disulfide, Sulphur, Sulphuric acid, sodium sulfite, sodium thiosulfate, sodium hydrosulfide, sodium sulfide, calcium sulfate, ammonium sulfate, thiourea, gypsum, etc.

Chemicals management is a core issue for responsible viscose production. CV will improve the closed-loop management' s intensity with inputs from stakeholders' concerns and needs.

(5) Energy consumption and carbon emission

Energy consumed by enterprises mainly consists of purchased electricity and coal[31]. CV members have eliminated high energy consumption equipment, increased energy efficiency and reduced coal and power consumptions by cleaner production measures such as heat recovery, steam recycling, etc. In 2019, the energy consumption per unit of products of CV members was 868.98kgce/t, representing a decline of 48% and 9% from that in 2005 and 2018, respectively.

As the greenhouse gas quotas for the viscose industry have not been allocated, most enterprises have not set greenhouse gas emission reduction targets. However, some CV member enterprises (Sateri, Sanyou, Grace and Silverhawk) have carried out activities related to the verification of greenhouse gas emissions. Sateri launched the EcoCosy Climate Leadership in conjunction with the CNTAC, in a bid to explore the product innovation-driven solutions to reducing emissions within the industrial chain. Sanyou set emission reduction targets according to the different conditions of their companies and the statistics of carbon dioxide produced per ton of fiber in recent years. Grace and Silverhawk calculated corporate carbon emissions in 2018 and 2019.

31.Used for power generation and steam production in thermal power plants.

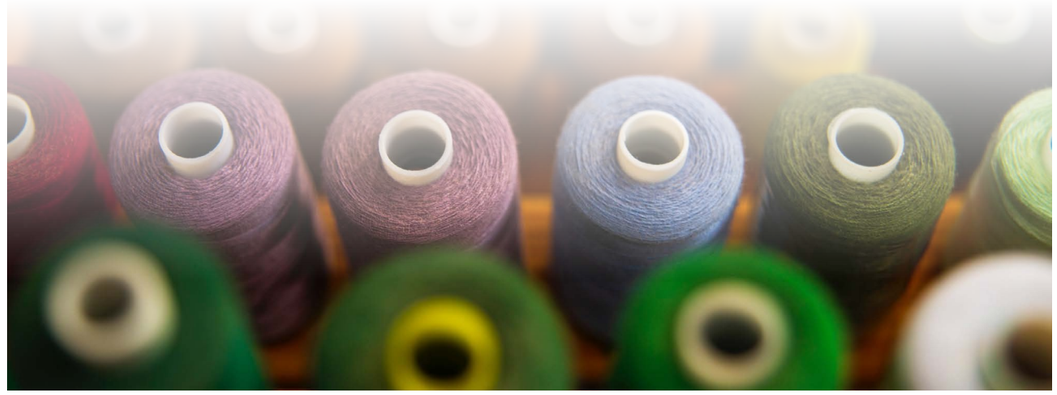
Industrial solutions to climate change through product innovation

In 2019, Sateri launched the EcoCosy® Climate Leadership Project in conjunction with the CNTAC. Eight downstream partners in the industrial chain were invited to discuss how to drive the implementation of a climate action plan for energy conservation and emission reduction among industrial chain through innovation in raw materials and products by upstream enterprises in the the industrial chain. These eight enterprises were Zhejiang Saintyear Textile Co., Ltd., Zhejiang Charming Holding Co., Ltd., Suzhou Pure-Fiber Textile Technology Co. Ltd., Xuzhou Huasheng Textile Co., Ltd., Huixian Jinyu Textile Co., Ltd., Fujian Xinhuayuan Group, Linz (Nanjing) Viscose Yarn Co., Ltd., and Shandong Long Run Textile Co., Ltd.

The project analyzed the results of greenhouse gas emissions from the EcoCosy® series in the downstream industrial through field research and scientific calculation, and compared the T-shirts produced with different types of fibers in terms of yarn production and incineration of disposal. The research results showed that, the innovations in upstream fiber raw material products can help downstream textile enterprises to increase production efficiency, reduce energy consumption, break the stereotype that energy saving and emission reduction requires a large upfront investment (such as updating equipment), and promote the implementation of energy-saving and emission reduction actions as well as awareness-raising activities among downstream enterprises.

Full life-cycle links	GHG emissions ($kgCO_2e/kg$)		
	Cotton	Polyester staple fiber	Viscose staple fiber (EcoCosy®BV fiber)
End of life cycle	0	2.03	0
Use	3.9	2.4	2.4
Retail	0.46	0.46	0.46
Garment manufacturing	0.67	0.64	0.64
Fabric production	0.66	3.17	1.16
Yarn production	2.48	2.96	1.86

Table The potential for greenhouse gas emissions reduction of EcoCosy ® BV fiber in the downstream industrial chain of fiber production[32]



32.EcoCosy ® Climate Leadership White Paper 2020

3.6 Social Responsibility of CV members

The social welfare investment of CV members in 2019 was more than RMB 8.7 million[33], which was used to assist employees in needs and promote community poverty buffer, public welfare education, biodiversity protection and charitable donations. Take the social public welfare activities of Sanyou, Zhongtai, Silverhawk, Xinxiang and Sateri (Fujian) as an example.

Sanyou Help underprivileged students attend school, and provide convenience

Zhongtai Provide assistance to ethnic minorities in difficult circumstances in Xini'er Village.

Silverhawk Invest in the establishment of Yinying Wenchang Middle School – the first private junior high school in Gaomi.

Xinxiang Provide free clinical treatment services for villagers, and donation to help people in difficult circumstances.

Sateri Launch the Sateri EcoCosy Charity Walking Challenge along the "Most Beautiful Shoreline of the Yangtze River", and donate a scholarship of RMB 100,000 to excellent students facing financial difficulties in Jiujiang.

Jilin Chemical Fiber Providing pairing assistance to Mahutou Village.

33.Refer to 8 enterprises that have reached the first-stage sustainable development goals, including Xinxiang Chemical Fiber.

The global outbreak of COVID-19 in December 2019 caused an extreme shortage of masks and protective suits. As the producers of fiber raw materials, CV members overcame difficulties in raw material procurement and labor shortage, and fulfilled their social responsibilities by supporting COVID-19 control. For example, they donated materials, increased production, changed their production lines and expanded the scale of production. To tackle COVID-19, Grace built a new melt-blown non-woven fabric production line within one month. By doing so, it provided raw materials for 14 mask production lines (including two production lines for N95 masks) and contributed to addressing the shortage of core medical supplies for epidemic prevention and control.

Figure: Melt-blown non-woven fabric workshop and production line of Grace

Chapter IV

Innovative Sustainable Practices of CV members in 2019

4.1 Raw material innovation

The main raw materials for viscose production are dissolving pulp. On the one hand, most of the feedstock for dissolving wood pulp in China is imported from other countries. On the other hand, the sustainability of dissolving wood pulp is a key concern for sustainable development throughout its life cycle. To solve these problems, the industry is actively exploring the options to increase the sourcing of raw materials and producing dissolving pulp with linter and textiles waste as alternative materials for wood dissolving pulp.

(1) Production of viscose with agricultural waste such as linter

Some CV members, including Silverhawk and Sanyou are developing a green process to produce pulp with linter. This process produces dissolving cotton pulp with linter through core technologies that adjust polymerization degree by rapid reaction at a low temperature. This has greatly improved the cleaner production level of the pulp process with linter and able to continuous production.
Some CV members such as Jilin and Xinxiang have passed the Recycled Claim Standard (RCS) certification, which improves the traceability of the entire value chain, which includes source, production, and sales of agricultural waste, and ensures that the transparency of the supplying raw materials for high-quality brand enterprises.

(2) Production of viscose with post-consumer textile

This method uses recyclable dissolving cotton pulp produced with post-consumer textiles (such as jeans, T-shirts and other clothes) as raw materials through a series of chemical methods to produce high-quality and environmentally-friendly textile fibers such as viscose and soluble fibers. These products can replace some of the dissolving pulp used, and effectively use post-consumer waste textiles as new available resources, with a positive effect on the environment and integrate the concept of circular economy.
In June 2019, Sanyou signed a cooperation agreement with Re:newcell. According to the agreement, Sanyou produced the first batch of ReVisco™ fiber from 50% post-consumer textiles pulp of Re:newcell and 50% FSC-certified dissolving wood pulp as raw materials.
In February 2020, Sanyou cooperated with Södra to purchase pulp produced through the waste textile recycling technology of Södra.
In March 2020, Sateri successfully produced recycled viscose fiber FinexTM and built its capacity for large-scale commercial mass production. The fiber uses dissolving pulp made from recycled post-consumer textile waste by Swedish company Södra.

Figure: Sanyou’s ReVisco™ Fiber Label

Figure: Sateri’s Finex™Fiber

Figure: EcoCosy™ tag

4.2 Product Innovation

（1）Traceable fiber products

Sateri EcoCosy™

Adopting the Sateri BV® technology and using dissolving pulp with PEFC-certified wood sources as its raw materials, the production process of Sateri EcoCosy™ strictly controls resource consumption and pollutant emissions, and passes the highest Sustainable Textile Production (STeP) by OEKO-TEX®. Its average score for Higg FEM3.0 tripartite verification reaches 90% and its products have been certified as 100% bio-based by USDA in the United States. Besides, an EcoCosy™ tag system from the proprietary virtual certificate (VC) platform was established. A BV yarn project was launched to realize the traceability management across the industrial chain, and establish a transparent and trustworthy cooperation model covering the whole industrial chain through a chain-of-custody (COC) for forestry products and virtual certificate (VC) technology as tags.

Sanyou ™Tangcell®

As a high-end cellulose fiber brand affiliated by Sanyou, Tangcell® conforms to the sustainable development model of the entire industry chain, with its raw materials 100% coming from FSC --certified dissolving pulp. Its production process follows an innovative chemical recycling model, and its factory has passed EU-BAT certification. The products can be biodegraded to original natural substances at the end of the life cycle, and then re-enter the ecological cycle. By using molecular tracking technology and testing methods for specific components, Sanyou realized the traceability of EcoTang™ fiber, that is, the fiber can still be identified in the product after processing and transformation of the textile products through the industrial value chain.

（2）New fiber products dyed by stock solution

Viscose dyeing by stock solution combines cellulose fiber with environmentally-friendly pigments in an organic way, adds a certain quantity of pigments to viscose using the pre-spinning injection technology, and removes the subsequent dyeing and finishing process. By doing so, it can save energy and reduce the discharge of wastewater from dyeing and finishing. CV members who adopt this process are Sanyou, Sateri and Shandong Silverhawk.

4.3 Innovation in Green Production

01 New cellulose solvent technology of Xinxiang

Research on new solvent systems is a development focus for green production technology for MMCF. Xinxiang has established a strong partnership with advanced institutes in China to develop new solvent in spinning technology for natural cellulose that is sustainable and environmentally friendly. Ionic liquid is a green color solvent with unique advantages in dissolving spinning. Its dissolving process is simple, green and pollution-free, and can achieve 90% similarity between the product and its natural equivalent. Xinxiang is working with the Institute of Process Engineering, CAS, to solve technical problems in the controllable dissolution of animal keratin and cellulose, and promote independent development of fiber spinning technology with ionic liquid.

02 Xinxiang’s acid wastewater recycling technology

Specific to the high acidity of the second and third water washing’s wastewater in filament production, this technology adopts a two-stage filtration plus two-stage reverse osmosis treatment (RO), which can achieve on average a daily reduction of 5,500 tonnes of total wastewater discharge, and an annual reduction of 2 million tonnes of demineralized water collected and discharged. The produced water is mixed with RO produced water from the water supply station. After heating up, it is treated by the cation-anion ion exchange bed into desalinated water for use in the filament. The average temperature of desalinated water can be increased from 16.5°C to 26.5°C (a growth of 10°C), which can save 88.22 tonnes of steam consumption per day from heating desalinated water, and 32,200 tonnes of steam per year.

03 Refrigeration technology through wastewater and waste heat utilization of Yamei

The equipment used in this technology includes a wide-channel heat exchanger and a lithium bromide refrigeration unit. The hot waste water at 88 passes through the wide-channel heat exchanger to heat the process water to above 70 , which enters the lithium bromide unit for recycling. The desalinated water at an average temperature of 29 enters the lithium bromide unit to cool down to 10 , and then flows to the viscose production as stock solution. This technology can dispose wastewater of 3.2 million m3/h. Compared with the compressor refrigerating unit, it saves about 5.13 million KW power consumption, 630 tonnes of standard coal per year, and 45.38 million tonnes of CO2 emissions per year.

04 Extrusion washing wastewater recovery and treatment technology of Jilin

This technology adopts domestic advanced film processing technology, ultrafiltration film separation technology and reverse osmosis film separation technology to carry out advanced treatment for wastewater discharged from the end of the viscose fiber after treatment process. Adopting a discrete control system, the whole process utilizes automatic control. After treatment the water quality reaches the desalinated water standard and it is supplied to the viscose fiber production. This wastewater has a high temperature and contains a lot of heat energy, which can save energy consumption after recycling. It’s estimated that this technology can save more than 10 million tonnes of fresh water and 130,000 tonnes of gas per year.

05 Biochemical tank waste gas treatment system of Zhongtai

The system uses biochemical waste gas treatment technology with high-density bacteria arrays developed by Langkun (Beijing) New Environmental Protection Technology Co., LTD. This technology uses the original biological treatment method featuring the symbiosis of microorganisms and bacteria, and grafts the flora existing in nature onto a professional culture medium by following the law of ecological chain development. Supplemented by an optimal living environment, the rate of pollutant production and degradation can be matched, and the treatment of waste gas can be achieved. The system was put into operation in October 2019, with a removal rate of odors (H2S, CS2) in the waste gas at 95% after testing.

06 Biochemical waste gas treatment technology of Sanyou

By using micro-organisms for the treatment of low-concentration sulfur-containing waste gas in the viscose industry, the technology can efficiently dispose of sulfur-containing substances in waste gas, without generating new gaseous pollutants in the gas after treatment. The biochemical devices are controlled by PLC system, enabling 100% intelligent operations.

Figure：Extrusion washing wastewater treatment equipment of Jilin

Figure: Sanyou’s equipment for the disposal of low-concentration waste gas through the biochemical process

4.4 Protecting the Ecological Environment

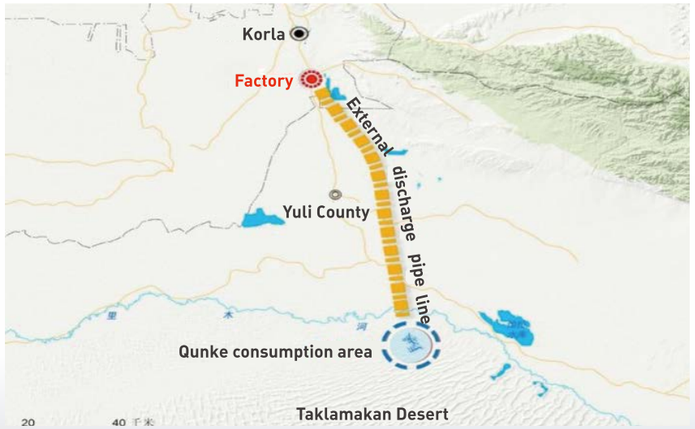
(1) Sateri’s ecosystem protection plan

Sateri has an active plan in the ecosystem protection of the source of raw material to ensure the coexistence of high-quality raw materials and sound ecosystems. The protection plan aims to protect, restore, and preserve swamp forests with high ecological value. The protection zone covers an area of 150,000 hectares. Since its establishment in 2013, the ecosystem protection plan has implemented several sub-projects in the field of biodiversity and climate change for many years in a row, including biodiversity research, forest protection, development of forest fire control plans and calculation of carbon reserves. At the same time, the advancement of the protection plan has also encouraged local residents to carry out traditional agricultural activities in a sustainable way, such as farming, fishing, and honey brewing.

The Ulungur River Basin in Altay, Xinjiang is home to the only castors in China, namely Castor fiber birulai (a sub-species of Castor fiber). According to statistics from local animal and wildlife protection agencies, there are only about 500 castor fiber birulais, and they are listed as wild animals requiring first-grade state protection. In 2019, the EcoCosy ® brand worked with Semir and ACFN to support the Castor Canteen Public Welfare Project launched by the True Nature Vision Nature Conservation Association. This project is devoted to the survival of the castor and the prevention of soil erosion in the Ulungur River Basin.

(3) Zhongtai – Qunke Reservoir

Zhongtai is located in Korla，Xinjiang, close to the Taklamakan Desert. The company has invested tens of millions yuan in a comprehensive tail treatment project for green development, with the aim of realizing comprehensive utilization of tail water while improving the ecology and environment of the Taklamakan Desert and along the Tarim River. The project has reduced COD in the wastewater to 30-50mg/L with a proprietary profound wastewater treatment facility, transmitted the water to the Qunke absorption site in the Taklamakan Desert, and built the Qunke Reservoir. The enterprise worked with the Nanjing Institute of Environment Sciences of the Ministry of Ecology and Environment and the Xinjiang Institute of Ecology and Geography of Chinese Academy of Sciences to carry out a hydrogeological survey, taking and analyzing the samples around the Qunke Reservoir in batches. A variety of drought-resistant and alkali-tolerant green vegetation suitable for the desert environment has been planted, such as saxaul, rose willow， reeds and multiple creatures such as white swans and wild ducks have been bred. The reservoir has attracted many kinds of wild migratory birds, which had a significant effect on biodiversity, improved the fragile and sensitive ecological environment, and achieved a win-win result in terms of restoration of the desert ecosystem and enterprise’s comprehensive utilization of wastewater. In order to significantly reduce the salt content in wastewater, Zhongtai Textile increased its investment in 2019. The project is scheduled to be completed in 2020.



Chapter V

CV Sustainability Outlook for 2020

5.1 Sustainability challenges for CV

(1) Requirements for Sustainable Management in the Entire Industrial Chain

The main external risks for viscose industry come from three aspects: increasingly stringent environmental protection policies and standards issued by the government; requirements of the end market for sustainability, traceability, and transparency of the entire industrial chain; and market competition for other renewable and sustainable fibers.

The year 2020 has seen a profound transformation of the global fashion industry. Sustainable fashion has become a major trend and topic. With the increasing demand for sustainable fashion, manyinternational retailing brands have developed their own future development strategies with sustainable markets at the core, and established clear visions and plans. Cutting-edge manufacturing enterprises in the industrial chain have begun to embrace innovations in technology and equipment and sought for new models, with the aim of exploring new drivers of growth through sustainable transformation and model upgrading.

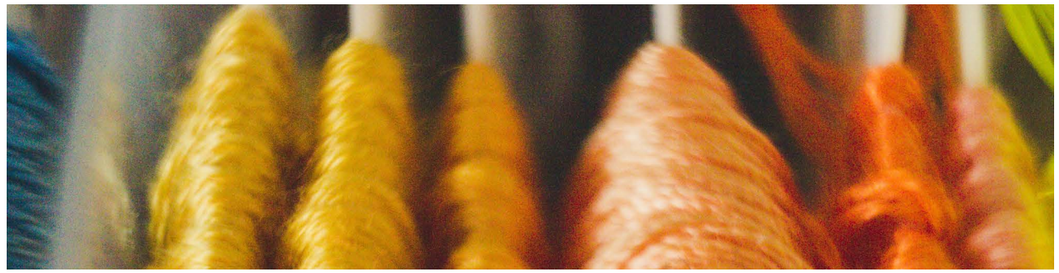
The scope of sustainability continues to extend, from the sustainable development of materials or products to the materials and product value chain across the whole life cycle. Higher requirements have also emerged in the market for traceability, verifiability, and transparency of enterprises’ material and product supply chains.

(2) Downward economic pressure

Impacted by COVID-19, we are less optimistic about global economy in 2020. Textile and apparel enterprises are facing more severe challenges. According to the International Monetary Fund (IMF), due to trade frictions in 2019, the growth rate of global economy has fallen to its lowest level since 2009. This decline has been intensified by the outbreak of COVID-19 in 2020.

Data from the National Bureau of Statistics and China Customs shows that the economic pressure facing by the textile industry in 2020 has increased significantly due to the pandemic. From January to February 2020, the added value of the textile industry above a designated size across China (including spinning, weaving, knitting, printing and dyeing and manufactured goods for household and industrial use) fell by 27.2% year-on-year, , the apparel industry fell by 28.9% year-on-year, and the chemical fiber industry decreased by 10.7% year-on-year. According to the statistics, all 15 major product categories presented a negative growth in production, of which over 50% saw negative growth by more than 30%. The retail sales per unit of clothing and shoes and knitwear above a designated size nationwide fell by 30.9% year-on-year, with a decline rate obviously exceeding that of rigid consumer demand products such as food and daily necessities. Textile and apparel exports fell by 20% over the previous year.

Affected by the international economic situation, CV witnessed a decline in its economic benefits in 2019. Hit by COVID-19 in 2020, CV members are expected to face greater economic pressure. How to improve sustainable development under the basic premise of supporting normal business operations of enterprises is an important challenge to be addressed.



5.2 CV’s Sustainability Vision for 2020

The year 2020 marks the last year of the implementation of CV Roadmap, and also the beginning year for its 2020-2025 Plan. Going forward, CV will continue to promote the implementation of the Roadmap and Three-Year Action Plan to improve its sustainable governance model and sustainable development performance by relying on its Industry Information Publishing Platform, Green Industrial Chain Sharing Platform, Sustainable Development Management Platform, and Advanced Technology Promotion Platform, and actively responding to internal and external challenges and risks,
Moreover, in order to lead the sustainable development of viscose, CV will formulate the Roadmap 2025 based on relevant topics such as sustainable procurement, responsible production, product safety, stakeholder relations to propose medium and long-term goals for sustainable development of the industry.

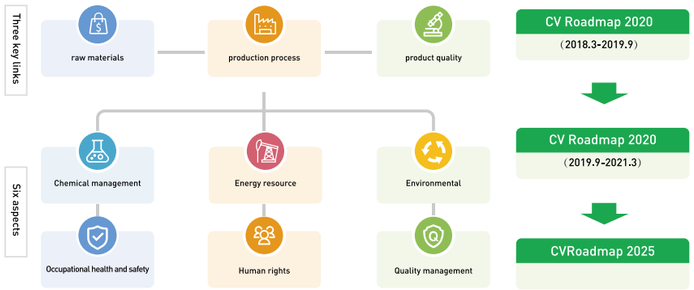


Figure: Execution and continuation of the CV Roadmap

（1）Enhancing the implementation of CV Roadmap

01 Giving priority to the cleaner production review in an all-round aspect, putting forward suggestions on improvement and renovation of enterprises, and improving the sustainable production performance of enterprises to ensure that they meet the high-level requirements set by the CV Roadmap second stage. At the same time, inviting a third-party verification agency participate in the review and evaluating the compliance of CV members with EU-BAT and the feasibility of comprehensively implementing the EU-BAT evaluation.

02 Continuing to create favorable conditions for mutual visits and experience exchanges among CV members, organizing the declaration of advanced technologies, identifying and promoting advanced solutions to key common technical problems in the industry, and taking effective measures to improve the sustainable performance of enterprises.

03 Continuing to organize exchange activities among stakeholders, releasing the CV Sustainability Report, and organizing a variety of activities such as the CV Sustainable Textile Creative Design Competition, so as to display the industry’s image for sustainable development and enhance its influence in this regard.

（2）Developing the CV Roadmap 2025

CV has been determined to develop the CV Roadmap 2025 based on the practical implementation of the original Roadmap. The key focuses are sustainable procurement policy for dissolved pulp, improvement on sustainable indicators in the responsible production process and inhering relevant third-parties’ standards, specifications and guidelines for the viscose industry.

01 Together with pulp suppliers and stakeholders, establishing sustainable procurement policies for the viscose industry. Policy should provide unify procurement guidance and requirements, Moreover, it should align sustainable procurement supply with the demand, and guiding the industry to increase its sustainable procurement proportion.

02 Encourage enterprises to take the initiative of adopting third-party standards (EU - BAT, Bluesign, ZDHC MMCF guidline, CanopyStyle, etc.) to evaluate their sustainable development progress. CV will also formulate the third-party standards to be implemented in the CV Roadmap 2025 with feedback from enterprises, as well as the applicability, coverage, transparency, participation, update frequency and the repetition of various standards taken into account.

03 Promoting the phased implementation of the Roadmap, consistently disclosing the Roadmap implementation progress, regularly communicating with key stakeholders, and helping CV reach a higher level of sustainable development in line with the principle of continuous improvement that based on the reality of the industry.

（3）Increasing the influence of CV brands

Viscose producers are facing increasing downward economic pressure. In order to support CV members to continue business operation as usual, enhancing sustainable development pressure into a driving force as business and brand strength of competitiveness, CV is taking actions in the following two aspects:
(i) Promoting its CV product label, forming a management system for green products certified by CV along the upstream to downstream industrial chain, and providing traceable and verifiable products for the end market by building a traceable industry;
(ii) Supporting enterprises in developing differentiated sustainable fiber products so as to meet the diverse requirements of the market and cope with uncertain risks.

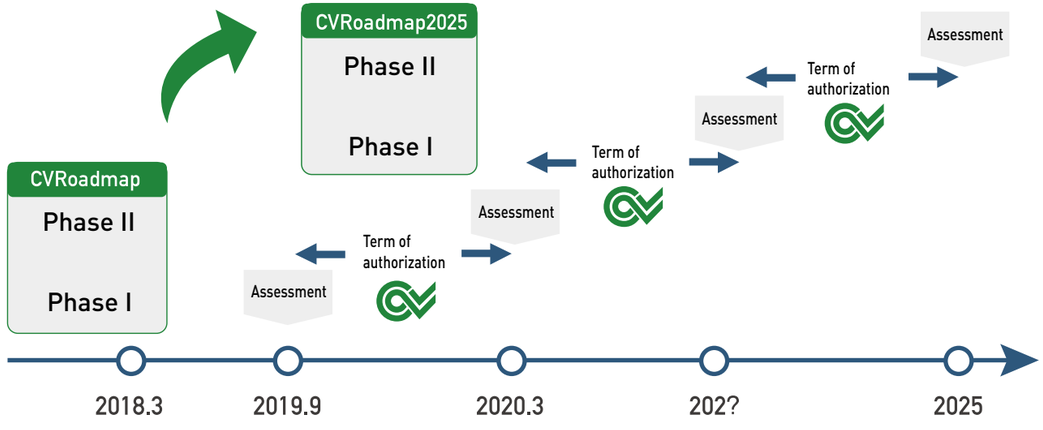


Figure: CV labelling program

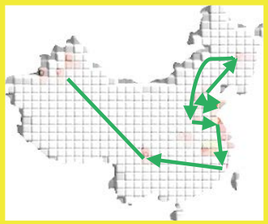
Appendix I CV Milestones in 2019

Dialogues between multiple stakeholders

January

Exchange Meeting between CV Members & ZDHC Signatory Brands

March



"CV Garden Factory" On-the-spot investigation

June

Exchange meeting between CV & stakeholders

July

2018 Sustainability Report released Committing Responsibility to Nature: From Wood to Fashion

August

Green Production Activity Series Yamei

September

Green Production Activity Series Zhongtai

December

CV and Brands Dialogue Conference

Appendix I List of CV industrial chain Members

1	Allmed Medical Products Co.,Ltd.
2	Anhui Hanlian Color Spun Co.,Ltd.
3	Anhui Golden Spring Non Woven Fabrics Co.,Ltd.
4	Anhui Yuhua Textile Limited Company
5	Bazhou Jinfu Special Yarn Industry Co.,Ltd.
6	Bofin Textile Co.,Ltd.
7	Changzhou Texhong Textile Co.,Ltd.
8	Dalian Ruiguang Nonwoven Group Co.,Ltd.
9	Great United New Material(Suzhou)Co.,Ltd.
10	Da Yuan Development No-Wovens Fabric Tian Jin Co.,Ltd.
11	Danyang Dansheng Textile Co.,Ltd.
12	Dezhou Aiku Import And Export Co.,Ltd.
13	Dezhou Hengfeng Group Co.,Ltd.
14	De Zhou Hua Yuan Eco-Technology Co.,Ltd.
15	Eastex Industrial Science And Technology Co.,Ltd.
16	Fuding Aolaite Nonwoven Co.,Ltd.
17	Fujian Changle Jinyuan Textile Co.,Ltd.
18	Fujian Long Yuan Textile Co.,Ltd.
19	Fujian Nanfang Textile Co.,Ltd.
20	Fujian Sanming Textile Co.,Ltd.
21	Fujian Changle Second Cotton Textile Factory
22	Fujian Changle Changyuan Textile Co.,Ltd.
23	Fujian Changle Jinyuan Textile Co.,Ltd.
24	Fujian Changle Zhengxin Textile Co.,Ltd.
25	Fujian Shunyuan Textile Co.,Ltd.
26	Fujian Xiangyuan Textile Co.,Ltd.
27	Fujian Yi Lai Shi Ye Co.,Ltd.
28	Fujian Changle Changyuan Textile Co.,Ltd.
29	Fuzhou Develop Zone Zhengtai Textile Co.,Ltd.
30	Fuzhou Xianglong Textile Co.,Ltd.
31	Fuxin Fu Zhi Yuan Textile Co.,Ltd.
32	Gaoan Wei Xin Textile Co.,Ltd.
33	Hainan Xinlong-Nonwovens Inc.,Ltd.
34	Hangzhou Chun Hui Textile Co.,Ltd.
35	Hangzhou Da Jia Textile Co.,Ltd.
36	Hangzhou Dong Feng Textile Co.,Ltd.
37	Hangzhou Guo Jin Textile Co.,Ltd.
38	Hangzhou Hongfeng Textile Group Co.,Ltd.
39	Hangzhou Nbond Nonwovens Co.,Ltd.
40	Hangzhou Xiaoshan Linfen Textile Co.,Ltd.
41	Hangzhou X-Yuan Spinning Co.,Ltd.
42	Hangzhou Yi Jing Textile Co.,Ltd.
43	Hebei Xue Yang Textile Co.,Ltd.
44	Henan No.1 Textile Co.,Ltd.
45	Henan Pingmian Textile Group Co.,Ltd.
46	Henan Yuzhou Shenyu Textile Co.,Ltd.
47	HENGFENG GROUP
48	Hongyang Holding Group Co., Ltd.
49	High tech branch of Hunan Yunjin Group Co., Ltd.
50	Huafu Fashion Co.,Ltd.
51	Huixian Jinyu Textile Co.,Ltd.
52	Jilin Four Seasons Harvest Textile Co.,Ltd.
53	Jihua 3542 Textile Co.,Ltd.
54	Jiamusi Tian He Textile Co.,Ltd.
55	Jiaxing Heng Rui Textile Co.,Ltd.
56	Jiaxing Tianzhihau Textile Co.,Ltd.
57	Jiangsu Bao Da Textile Co.,Ltd.
58	Jiangsu Dasheng Group Co.,Ltd.
59	Jiangsu Dong Hua Textile Co.,Ltd.
60	JIANGSU JIN MILAN TEXTILE CO.,LTD.
61	Jiangsu Kangni Group Co.,Ltd.
62	Jiangsu Shazhou Printing And Dyeing Group
63	Jiangsu Tianhua Color Spinning Co., Ltd.
64	JINLAN TOP DYED MELANGE
65	Jiangsu Xinfu Fiber Technology Co., Ltd.
66	JIANGSU YDTEX GROUP CO.,LTD
67	Jiangxi Da Jia Natural Special Fiber Co., Ltd.
68	HUA CHUAN COLORED SPINNING Textile Co.,Ltd.
69	Jiangsu Jinyuan Textile Co.,Ltd.
70	Jiangyin Shuang Yuan Nonwoven Co.,Ltd.
71	Jiangyin Tian Hua Yarn Co.,Ltd.
72	Wujiang Jingyi Special Fiber Co., Ltd.
73	Jingzhou AODA Textile Co.,Ltd.
74	Lan Sha Suzhou Technology Co.,Ltd.
75	Linz Textile Holding Co., Ltd.
76	Linyi Kaihang Nonwovens New Material Co.,Ltd.
77	Linyi Jinling Textile Co.,Ltd.
78	Shandong Mengyin Huifeng Textile Co.,Ltd.
79	Nantong Textile Group Co.,Ltd.
80	Nantong Shuanghong Textile Co.,Ltd.
81	Nanyang Textile Group Co.,Ltd.
82	Ningxia Ruyi Technology&Fashion Industry Co.,Ltd
83	Peixian Longsheng Textile Co.,Ltd.
84	Peixian New Silk Road Textile Co., Ltd.
85	Qilu Hongye Textile Group Co.,Ltd.
86	Qingdao Textile Group Co.,Ltd.
87	Qingzhou Yinlong Textile Co.,Ltd.
88	Quanzhou Ming Hen Textile Co.,Ltd.
89	Rugao City Dingyan Textile Co.,Ltd.
90	Shandong Binzhou Jinyuan Textile Co.,Ltd.
91	Shandong Chaoyue Textile Co.,Ltd.
92	Dahai Group Co.,Ltd.
93	Shandong Derun New Material Technology Co.,Ltd.
94	Shandong Dashing Cashmere Textile Co.,Ltd.
95	Shandong Heyue Nonwoven Material Co.,Ltd.
96	Shandong Hongtai Textile Technology Co.,Ltd.
97	Shandong Longhua Textile Co.,Ltd.
98	Shandong Huaxing Textile Group Co.,Ltd.
99	Shandong Long Run Textile Co.,Ltd.
100	Shandong Mengyin Huifeng Textile Co.,Ltd.
101	Shandong Mingsheng Textile (Group)Co.,Ltd.
102	Shandong Ruyi Technology Group Co.,Ltd.
103	Shandong Gaomi Kangtai Textile Co.,Ltd.
104	Shandong Yongxin Nonwoven Material Co.,Ltd.
105	Shandong Shenghe Textile Co.,Ltd.
106	Shandong Shuaike New Material Technology Co.,Ltd.
107	Shandong Wenshang Ruyi Runfa Textile Co.,Ltd
108	Shandong Xinguang Co.,Ltd.
109	Shandong Yanggu Shunda Textile Co.,Ltd.
110	Shandong Zhenkai New Material Co.,Ltd.
111	Shanghai Textile Group Dafeng Textile Co.,Ltd.
112	Shaoxing Chengsheng Textile Co.,Ltd.
113	Shaoxing Weisheng Color Spinning Co.,Ltd.
114	Shaoxing Shujieya Nonwoven Material Co.,Ltd.
115	Siping Xingda Textile Co.,Ltd.
116	Su Zhou Pu Re-Fiber Textile Technology Co.,Ltd.
117	Suzhou Sishon Bio-Cellulose Co.,Ltd.
118	Suzhou Shunjie Spunlaced Composite Material Co.,Ltd.
119	Suzhou Yongjinda Textile Co.,Ltd.
120	Su Zhou Zhenlun Spinning Co.,Ltd.
121	Texhong Textile Group Co.,Ltd.
122	Taifeng Textile Co.,Ltd.
123	Weiqiao Textile Co.,Ltd.
124	Weifang Hengjin Nonwoven Material Co.,Ltd.
125	Wuxi Si-Mian Textile Co.,Ltd.
126	Wuxi No.1 Cotton Mill Textile Group Co.,Ltd.
127	Wujiang Jingyi Special Fiber Co., Ltd.
128	Wujiang City Zhenzhou Air-Jet Loom Factory
129	Five Rings(Group)Shareholding Co.,Ltd.
130	Wuhan Yudahua Textile And Garment Group Co.,Ltd.
131	Xiajin Fengrun Co., Ltd.
132	Xiajin Ruixin Textile Co.,Ltd.
133	Xinhuayuan Textile Co.,Ltd.
134	Xin Jiang Fulizhenlun Spinning Co.,Ltd.
135	Xinxiang Guanghua Textile Co.,Ltd.
136	Xinxiang Longbo Textile Co.,Ltd.
137	Xuzhou Huasheng Textile Co.,Ltd.
138	Xuzhou Jiaxin Textile Co.,Ltd.
139	Xuzhou Jinye Textile Technology Co.,Ltd.
140	Yichun Jiayi Textile Co.,Ltd.
141	Yibin Boyang Textile Technology Co.,Ltd.
142	Intel-Tex(Suzhou)New Textile Materials Technology Co.,Ltd.
143	Binzhou Yuyue Home Textile Co.,Ltd.
144	Far Spinning Industry(Wuxi)Co.,Ltd.
145	Zhangjiagang Hezhong Textile Co.,Ltd.
146	Zhangjiagang Zhongshi Textile Co.,Ltd.
147	Changchun Oriental Textile Group Co.,Ltd.
148	Zhejiang Bailian Nonwoven Technology Co.,Ltd.
149	Zhejiang Chunyuan Technology Textiles Co.,Ltd.
150	Zhejiang Dongfei Textile Co.,Ltd.
151	Zhejiang Hongyang Nonwoven Material Co.,Ltd.
152	Weida Textile Group Co.,Ltd.
153	Husheng Non-Woven Fabric Co.,Ltd.
154	Zhejiang Jinfan Textile Co.,Ltd.
155	Zhejiang Junfei Textile Co.,Ltd.
156	Zhejiang Longyouanda Textile Co.,Ltd.
157	Zhejiang Mingshengda Medical Technology Co.,Ltd.
158	Zhejiang Senlong Textile Co.,Ltd.
159	Zhejiang Wang Jin Nonwovens Co.,Ltd.
160	Hangzhou Zhengda Textile Co.,Ltd.
161	Zhucheng Fufu Textile Technology Co.,Ltd.
162	Chinatex G-Way Textiles Co.,Ltd.
163	Zibo Yinshilai Textile(Group)Co.,Ltd.

Appendix III List of CV members' pulp suppliers

SN	Pulp Supplier	Country
1	AustroCel Hallein	Austria
2	Lenzing Biocel	Austria
3	Bracell	Brazil
4	Jari	Brazil
5	Fortress	Canada
6	Anhui Huatai	China
7	Asia Symbol	China
8	Fujian Qingshan	China
9	Hunan Juntai	China
10	Sun Paper	China
11	Yuelin	China
12	Lenzing Paskov	Czech
13	Stora Enso	Finland
14	APRIL	Indonesia
15	Toba	Indonesia
16	Oji	Japan
17	Sun Paper-Laos	Laos
18	Borregard	Norwegian
19	Caima	Portugal
20	Sappi	South Africa
21	Domsjo	Swedish
22	Sodra	Swedish
23	Phonenix	Thailand
24	Cosmo	USA
25	Rayonier	USA

Appendix IV Product list of CV Members

SN	From	Viscose staple fiber	Modal	Viscose filament yarn	Lyocell	Differentiated Viscose				
						Used for non-woven	dope-dyed	By Recycled pulp	By Bamboo pulp	Custom function
1	Tangshan Sanyou	√	√		√	√	√	√	√	√
2	Sateri	√			√	√	√	√		√
3	Zhongtai Textile	√				√				
4	Grace	√		√		√				√
5	Yamei Technology	√				√				
6	Shandong Silverhawk	√	√			√	√		√	√
7	Jilin Chemical Fiber	√		√				√	√	
8	Xinxiang Chemical Fiber			√	√			√		
9	Funing Aoyang	√								
10	CHTC Helon	—					—			

Appendix V Business Contacts

SN	From	name	Tel	Email
1	CV	Zhang Zixin	18810090403	zzx@cvroadmap.com
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4	Zhongtai	Wang Qi	18690680622	420649730@qq.com
5	Grace	Luo Kesheng	13568586308	550660798@qq.com
6	Yamei	Liu Runzhang	13561596777	bh_liurz@163.com
7	Aoyang	Zhang Jiqi	15951182528	ddhxzjq@163.com
8	Helon	Yan Jing	15863699916	748610605@qq.com
9	Jilin	Li Kui	15981175009	393133727@qq.com
10	Silverhawk	Guo Weicai	13791610126	yy.gwc@163.com
11	Xinxiang	Jin Xiaofei	13937392937	jinxf_qgc@bailu.cn

Appendix VI: CV Practices and UN SDGs

The sustainable development of CV covers three aspects of economic, environmental and social responsibility. According to the 17 Sustainable Development Goals (SDGs) included in the UN 2030 Agenda for Sustainable Development, the operation, production and sales of viscose enterprises are strongly related to 10 of them. With a sufficient understanding of the importance of SDGs for people and the planet, CV will make own contributions to the realization of the 2030 SDGs by fulfilling its economic, environmental and social responsibilities.

Highly relevant SDGs	Relevant practices of enterprises	Disclosure page
1 No poverty	Carry out targeted poverty alleviation and pairing assistance in impoverished areas, and support the development of local education and community through public welfare activities.	P30，P38
3 Healthy and well-being	Reduce the use of toxic chemicals, improve the recovery and utilization rate of chemicals, and reduce the emissions to the environmental media.	P30-31，P34-36
4 Quality education	Support the education development of counterpart support areas and local communities by carrying out educational assistance programs and setting up schools.	P38
6 Clean Water and Sanitation	Reduce the consumption of water resources and discharge of wastewater through water resource recycling, strictly control the discharge concentration of specific pollutants in wastewater, and establish a violation supervision mechanism to ensure the compliance discharge of enterprises.	P30-31，P35，P43，P45
8 Decent Work and Economic Growth	Promote the compliance operation of enterprises to create economic benefits and provide employment opportunities for citizens. In 2019, the annual sales volume of CV reached 26.7 billion yuan, providing 18,947 people with employment opportunities, with a social insurance coverage of employees reaching 100%.	P30
10 Reduced Inequality	Issue the list of advanced technology/equipment, organize exchange meetings and mutual visits among enterprises to promote the exchange between enterprises, facilitate the balanced development and fair competition of enterprises, and reduce technological monopoly.	P18，P25
12 Responsible Consumption and Production	Sustainable production and consumption is the main guiding principle for the establishment of CV, that’s, to promote the sustainable development of the industry through responsible procurement, production and operation of viscose, minimize the resource consumption and environmental pollution of the industry, and provide more differentiated and sustainable products for the consumer market.	P14，P17-27，P29-37
13 Climate Action	Some enterprises have carried out carbon emission screening work and explored ways to reduce emissions and provide sustainable products with lower carbon emissions.	P36-37
15 Life on Land	Promote the procurement of dissolving pulp passing the sustainable management forest management certification by CV members, formulate sustainable procurement policies at the CV level; and encourage enterprises to carry out environmental greening and ecosystem protection projects in surrounding communities.	P33
17 Partnerships to achieve the Goal	Carry out extensive stakeholder communication, understand the concerns of all parties, and build a sustainable governance model based on multi-stakeholder collaboration.	P18-20，P23

TÜV THÜRINGEN CHINA

Assurance Statement of Sustainability Report

TUV Thuringen (Shanghai) Co., Ltd. (‘TUV Thuringen Shanghai’ for short) has been commissioned by the management of The Collaboration for Sustainable Development of Viscose (‘CV’ for short) to carry out an independent assurance of the 2019 Social Responsibility Report of CV(‘report’ for short).

CV is responsible for the collection, analysis, aggregation and presentation of information within the Report. TUV Thuringen Shanghai’s responsibility in performing this work (assurance of the report) is in accordance with terms of reference agreed in the scope of engagement with CV. CV is the intended users of this statement.

This statement is based on the assumption that the data and information provided in the report is complete and true. This report is the second sustainability report for CV, and it’s for CV to invite TUV Thuringen Shanghai give independent assurance.

Assurance Scope

- The report revealed the accuracy and reliability for key performance, information and management system which happened in 2019.
- Assurance address is in 18 Chaoyangmen Ave. (N.), Beijing City, P.R.China., where CV head office locates.
- TUV Thuringen Shanghai evaluate the collection, analysis, aggregation of the information and data.

Due to the impact of the epidemic, and according to customer requirements, TUV Thuringen Shanghai conducted the Assurance of the Report through remote concentrated assessment on 07 July and 11 July, 2020.

Assurance Methodology

Assurance process including following activities:

- Review the document information which provide by CV;
- Interview the Secretariat of CV;
- Interview the persons who collected the report information;
- Interview the representatives from the members;
- View the related websites and media reports, verify the data and information through sampling method;
- Refer to China Sustainability Reporting Verification Rules and Instructions (CSR-VRAI) on Completeness, objectivity, suitability, responsiveness and development;
- Assessment of compliance with AA1000 AS (2018) Principles, type II, Medium Guarantee Level;
- Assurance activity is based on TUV Thuringen Shanghai Sustainability Report Assurance Procedure.

Assurance Conclusion

The Report provide an appropriate and objective view of the sustainability & social programs and performances in 2019. The data in report is reliable and objective, TUV Thuringen Shanghai didn’t find the system error or substantial error.

- The overall structure of the report is complete, and the information disclosure is clear, understandable and accessible;
- The report discloses the development status of the Collaboration for Sustainable Development of Viscose in 2019, describes the sustainable development governance model and the progress and practices in the aspect of economic, environmental and social responsibilities of viscose industry, and puts forward the sustainable development plan and roadmap of members from CV and product chain to meet the sustainable development needs of the entire industry/product chain;
- The report discloses the action and performance of the Collaboration for Sustainable Development of Viscose in practice its social responsibility in 2019 from the di-

mensions of environmental management, social responsibility and public development, and forecasts the vision of the CV's sustainable development by issuing the new CV roadmap 2025;
- In order to realize the stakeholders' requirement better, CV determined the key material aspects and disclosured them in the report, which feedback the stakeholder expectation and concerning well;
- The report discloses the Key performance of CV members, promises responsibilities, and promotes sustainable governance of the entire industry chain;
- The report actively benchmarks the United Nations 2030 Sustainable Development Goals (SDGs), reflecting its international vision and being forward-looking;
- As an industry organization, CV actively publicly releases social responsibility reports every year, which has good timeliness.

Suggestion for improvement

Through assurance and evaluation, TUV Thuringen Shanghai gives following improvement suggestion on social responsibility practice and management:

- It is suggested that the disclosure of the data related to CV members' social and economic, and the performance related to health & safety should be increased to enhance the completeness of the report;
- It is suggested that in terms of stakeholder participation, more attention should be paid to external communication, disclosure of cases in areas such as supplier development, NGO cooperation, etc.; actively investigate and disclose stakeholder evaluations and feedback on CV members' implementation of social responsibilities;
- It is suggested that the disclosure of negative performance data should be increased to enhance the objectivity and balance of the report;
- It is suggested to increase vertical data comparison to reflect the data and performance of CV members over three years, enhancing the report more comparable.

Special statement

This statement excluding:
- The activity outside information reveal;
- The position, idea, faith, object, future developing direction, and promise which stated by CV and its members.

Statement of Independence and Competence

TUV Thuringen e.V. is the world's famous certification body in inspection, testing and verification, and providing services which includes management systems and product certification; quality, environmental, health & Safety auditing and training; environmental; social responsibility and sustainability report assurance.

TUV Thuringen (Shanghai) Co., Ltd. is independence from The Collaboration for Sustainable Development of Viscose and confirms that there is no conflicts of interest with the organization or any of its members and stakeholders when performing the assurance of the Report to ensure its independence and impartiality. TUV Thuringen Shanghai was not involved in any manner with CV, when the latter was preparing the Report.

The Statement was issued by TUV Thuringen (Shanghai) Co., Ltd.

The Authorized person: Jia Hongwei

Date :12.07.2020

The Lead Assessor: Zhao Yuhong

Date :12.07.2020

Note: When there is a deference between the Chinese and English versions, please refer to the Chinese version.

2019

Collaboration for Sustainable Development of Viscose

Sustainability Report

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