EU BAT Assessment Report

EU BAT ASSESSMENT

Sateri (Jiujiang) Fibre Co., Ltd

COUNTRY: China

Sustainable Textile Solutions
30th May 2020

EU BAT Assessment Report

Sustainable Textile Solutions (STS) is a division of BluWin Ltd. (based in the UK). Solutions offered are clustered around the six cubes regenerative by design, sustainable fibers, processing excellence, clean chemistry, zero discharge of hazardous chemicals and climate positive. Each cube comprises impactful services which were developed with the objective to reduce the environmental footprint of the textile, leather, apparel and footwear production.

An interdisciplinary team of 50+ chemical engineers, dyers, textile & leather engineers, psychologists, environmental scientist, data analysists and economists give STS the unique position to derive innovative ideas and translate them to robust programs which drive the transformation of the apparel & footwear industry towards more sustainable production.
The multilingual global expert team is based in the key sourcing regions and works in 40+ countries.

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(1) Introduction

Sateri, a member of the Royal Golden Eagle (RGE) Group, is one of the leading companies in the viscose industry. Having acquired the technology and expertise from Finland, its modern viscose mills primarily use dissolving wood pulp from trees grown on plantations as the raw materials to produce high-quality viscose products, which are widely used in various textiles and non-woven hygiene products to offer good user experience.

Sateri began operations in China in 2004 as the first wholly foreign-owned cellulose company. Sateri is a global leader in viscose rayon. Its natural and high-quality fibre, made from trees grown on renewable plantations, can be found in comfortable textiles and skin-friendly hygiene products.

Sateri's range of high-quality viscose products is independently verified as safe and responsibly produced. Sateri is the world's first viscose company to obtain the MADE IN GREEN by OEKO-TEX® product label. Sateri's other certifications include STeP by OEKO-TEX®, STANDARD 100 by OEKO-TEX®, Chain of Custody (CoC) certification from the Programme for the Endorsement of Forestry Certification™ (PEFC™), ISO 9001 and ISO 14001. Sateri is one of the world's first viscose producers to have completed the Higg Facility Environmental Module (FEM) assessment. Sateri is a founding member of the Collaboration for Sustainable Development of Viscose (CV), an industry initiative to address sustainability challenges and drive market transformation.

Purpose and Scope of Assessment

Sustainable Textile Solutions was tasked to conduct an assessment on Sateri (Jiujiang) Fibre Co., Ltd on 30th May 2020 with the following objectives:

(1) Measure the ecological impact of production
(2) Assess the performance against European Union Best Available Techniques (EU BAT) limits.
(3) Identify gaps against EU BAT requirements

The following activities were undertaken:

(1) Primary Data Collection by the production unit in preparation for the on-site assessment

(2) On-site assessment

a) Opening Meeting

b) Factory Tour

c) Secondary Data Collection

d) Closing Meeting

(3)Data Analysis

(4)Report Writing

To validate the Facility's compliance against EU BAT limits, the following data were collected and analysed:

Resources and Process efficiency

- Fresh Water Consumption (M3/MTf)
- Energy Consumption (GJ/ MTf)
- Sulphur Emission (Kg/ MTf)
- CS2 (Kg/ MTf)

Utility Efficiency

- Chemical Consumption (Kg/ MTf)
  - Zn
  - H_2SO_4
  - NaOCl
- Sulphate emission (Kg/ MTf)
- Zn emission to water (g/ MTf)
- COD Load (g/ MTf)

(2) Facility Overview

Sateri (Jiujiang) Fibre Co., Ltd acquired this mill from Jiangxi Longda in 2015 and now has 5 production lines (viscose staple and Non-Woven). Sateri Jiujiang is on the banks of the Yangtze River and has its own port, ensuring excellent access and connectivity.

Facility treats all its wastewater onsite and has an installed capacity of 68000 m3/day. It consists of physical, biological and advanced treatment (fenton process) for fulfilment of all local pollution control board requirements. Facility purchases CS_2 and has storage in the same premises. Facility has its own captive power generation and onsite wastewater treatment plant. Facility is equipped with latest technology for air emission control and abatement.

Facility Name	Sateri (Jiujiang) Fibre Co., Ltd
Address	Jinshawan Industry Zone, Hukou County, Jinjiang City, Jiangxi Province 332500, China
Product Range	Nonwoven viscose material, Viscose for textile white, Dope dyed viscose fibre (black), Functional viscose like antibacterial etc.
Year of Establishment	2015
Processes	Viscose Fibre and Non-woven production

Process Flow Chart:

The raw material in this unit is pulp and process starts as follows

VISCOSE STAGE

Steeping of wood pulp – Process is carried out in pulper with caustic soda, where the pulp is fed in auto dosing system and mercerized instantly.

$C_6H_9O_4OH + NaOH \rightarrow C_6H_9O_4ONa + H_2O$ .....1)

Shredding – Pressed Slurry is added for Shredding followed by Ageing.

Ageing – In this process shredded alkali cellulose is slowly rotated in a drum for 4-6 hrs. In this process the DP (Degree of polymerization) of Fibres gets reduced to required levels. Afterward it passes through Xanthation step.

Xanthation & Dissolution – The Aged alkali cellulose is made to react with Carbon disulphide under vacuum in xanthator, which is later dissolved in caustic soda. The xanthator is then exhausted and the resultant slurry is dropped into dissolver for thorough dissolution.

$C_6H_9O_4ONa + CS_2 \rightarrow C_6H_9O_4OCSSNa + Na_2CS_2$ ……..2)

Ripening filtration & De-Aeration - This system consists of blenders, receivers, filtration and de- aerator.

$C_6H_9O_4OCSSNa$ + NaOH -> Viscose Solution (Mixing) ……3)

$C_6H_9O_4OCSSNa + H_2O \rightarrow C_6H_9O_4OH + CS_2$ +NaOH (Ripening)….. 4)

EXTRUSION STAGE

Spinning – Wet spinning takes place by coagulation of filtered and deaerated viscose in spin bath which consists of Sulphuric acid, Zinc and Sodium sulphate. This process can produce the Fibre count from 1.2 to 0.6 denier.

$C_6H_9O_4OCSSNa + H_2SO_4 \rightarrow C_6H_9O_4OH + CS_2 + Na_2SO_4$ ……5)

(3) Methodology

To meet the objective, we identified and validated both short- and long-term projects carried out by facility with respect to the environmental impact and the respective parameters for benchmarking as per Reference Document on Best Available Techniques in the Production of Polymers (http://eippcb.jrc.ec.europa.eu/sites/default/files/2019-11/pol_bref_0807.pdf) and applicable MMCF requirements.

Focus areas considered for this assessment are: Energy, Air emission and Chemical consumption.

The site has total of five manufacturing lines with two viscose fibre and rest for Non-Woven application fibres. The lines were fully in operation.

The data evaluated was for assessment period May 2019 - Apr 2020

Energy Intensity: Electricity, diesel and steam energy combined to form the total intensity in GJ/MTf of fibre production .

Air Emission: The factors considered for sulphur air emission with respect to total CS2 consumption are Recovery, carbon Adsorption Plant (CAP), condensation, caustic cleaning , process, Tail gas (Incineration) Sludge, Sulphide discharge, chimneys and desulphuration in present setup.

(4) Data Verification

The data analysis has been conducted for the timeframe of May 2019 to Apr 2020

(5) Environmental Impact

5a) Energy

Energy Consumption: May 2019 – Apr 2020

Individual processes have been considered for energy intensity and consumption. Data considered for energy intensity was Real time electricity(KWH) , diesel (MT), consumption and steam (MT) for production and operation for viscose production only. No data for steam captured for Power generation since in few places due to engineering control, was leading to double calculation. On pro-rata basis facility may show some savings in Power generation due to steam but to be more accurate and conservative only data only data having real time readings based on installed energy meters is used.

5b) Water

Facility has adopted water conservation and efficiency measures, including condensation and cooling water recovery processes.

5c) Air Emission

The data analysis has been conducted for the following timeframe:

Sulphur Emission: May 2019 - Apr 2020

Facility has conducted a detailed analysis of all check points at each stage for CS2 emission. CS2 emission is controlled by the CAP as abatement technique, and the total sulphur recovery rate was more than 96% for the timeframe in assessment.

5d) Wastewater

Wastewater & COD load (May 2019 - Apr 2020)

Facility has onsite wastewater treatment for whole site. Overall load for tenure was under limit.

(6) Plant Performance Comparison with EU BAT Limits

Data Comparison	Unit	EU BAT	EU BAT Status
Energy Intensity	GJ/MTf*	20-30	✓
Pulp Use	MT/MTf	1.035-1.065	✓
H_2SO_4	MT/MTf	0.6-1.0	✓
NaOH	MT/MTf	0.4-0.6	✓
CS_2	Kg/MTf	80-100	✓
COD Load	kg COD/MTF	3-5	✓
Zn	Kg/MTf	2-10	✓
Process Water	M3/MTf	35-70	✓
S to Air	Kg/MTf	12-20	✓
Spin Finish	Kg/MTf	3-5	✓
NaOCl	Kg/MTf	0-50	✓
Cooling Water	M3/MTf	189 - 260	✓
Sulphate ion (SO42) emissions in water	Kg/MTf	200-300	✓
Zn in wastewater	g/MTf	10 - 50	✓
Hazardous Waste	Kg/MTf	0.2- 2 Kg	✓
Noise	dB	55-70 dB(A)	✓

Table – 1

* MTf- Metric Tonnes fibre

** Based on test report

(7) Observations

1) Production

Observation

Facility have only one site in this location. Altogether, there are 5 spinning lines for viscose & non-woven production. This facility is dedicated to white viscose , dope dyed (black) and non-Woven and working with indigenous & state of the art technology from preparation to despatch.

2) Traceability

Observation

The site has PEFC/CFCC Chain of Custody (COC). This certification enables facility to demonstrate legal and sustainable sourcing of forest products to customers.

3) Environmental Impact Parameters

Observation

Facility has energy intensity below 19 GJ/MTf of fibre production. Energy intensity was calculated from consumption of electricity, steam, natural gas and diesel usages. The improvement in energy consumption is due to process improvements and energy savings in moving to closed-loop system, viscose maturing system, recirculation system, spin bath recovery system, fibre dryers etc. The waste energy has been recovered at several places as identified by the internal maintenance team to achieve short-term and long-term energy conservation targets. Facility installed CAP (Carbon Adsorption plant), caustic washing, for CS_2/ H_2S emission control and sulphur recovery. Total Sulphur emission calculation considered from stack emission, Caustic washing, Tail gas incineration, Sulphide, CAP adsorption etc.

3) Environmental Impact Parameters

Observation

Facility has their own wastewater treatment plant (WWTP) for primary , secondary & tertiary treatment and has direct discharge . Facility has its own laboratory to analyse the discharge parameters on a regular basis to meet the local pollution control board norms. COD discharge limits are well under EU BAT limits. Facility has a process in place to analyse wastewater from third-party to cross-verify the in-house reports. Current Wastewater treatment has state of the art process to control the hydraulic load due to seasonal impact like rainy and summer condition.

4) Salt recovery

Observation

As indicated in spinning bath chemical reaction, process generates sodium sulphate (Na_2SO_4) (Reaction -5) salt as by-product which is recovered and useful to other industries. It is important to optimize the recovery of the salt as per stoichiometric reaction step, to ensure reduced load on effluents. With increase of production, the quantity of salt increased, and the salt recovery has been maintained at a consistent level.

5) Hazardous Waste

Observation

It has been observed that facility segregates hazardous and non-hazardous waste at the generation point and controls waste generation every year. Annual hazard waste generation was well below industry average.

6) EU BAT

Observation

It has been observed that the facility is well within the range of EU BAT norms for viscose production.

(8) Conclusion

Sustainable Textile Solutions was tasked to conduct EU BAT Assessment at Sateri (Jiujiang) Fibre Co., Ltd on 30th May 2020 with the following objectives:

(1) Measure the ecological impact of production

(2) Assess the performance of Facility against EU BAT limits and in greenhouse gas (GHG) emissions

(3) Point out gaps against EU BAT limits

It can be concluded that:

(1) Facility was following local requirements for controlling ecological impact for viscose production.

(2) The air emission, energy intensity and rest for the facility was well under EU BAT norms for viscose production. Considering EU BAT Energy requirements limit i.e. 30GJ/MTf, the current practice in facility was saving approx. 1,100 Kg CO_2/MT of fibre production.

(3) There were no gaps identified against EU BAT in the data for the assessment period between May 2019 - Apr 2020.

- ----------End Of Report ----------