THANK YOU TO OUR 2018 MMC ROUND TABLE SPONSORS:

- **PARTNER**
  - Sustainable Textile Solutions

- **SUPPORTER**
  - Lenzing

**UNITED BY ACTION:**
ACCELERATING SUSTAINABILITY IN TEXTILES & FASHION
9:00 WELCOME & BACKGROUND TO THE CURRENT MMC LANDSCAPE
Simone Seisl, Textile Exchange
Nicole Lambert, Textile Exchange

9:20 SUPPLY CHAIN TRANSFORMATION
Dr. Siva Parili, STS Global

9:35 BEST PRACTICE AND INNOVATION IN VISCOSE SOURCING
Claire Bergkamp, Stella McCartney

9:50 FORESTS FOR FASHION – FASHION FOR FORESTS
Birgit Altmann, UNECE/FAO

10:05 INTRODUCTION OF WORKSHOPS AND EXPERTS

10:15 REFRESHMENT BREAK

10:40 WORKING SESSIONS
Choose one of the below workshops to join at the start. Half way through, you will be asked to choose a second workshop to join.

1: FORESTS AND MMC
Melissa Fillion of Canopy
Felix Romero of FSC

2: ALTERNATIVE TECHNOLOGIES AND PROCESSES FOR MMC
Eva van der Brugge of FashionForGood
Janne Poranen of Spinnova

3: CHEMICALS AND MMC
Christina Raab of ZDHC
Luo Zheng of Lenzing

4: CLOSING THE LOOP ON MMC
Claire Bergkamp of Stella McCartney
Amanda Carr of Canopy

12:00 WORKSHOP SUMMARIES AND WRAP UP
MMC LANDSCAPE

Nicole Lambert
Textile Exchange
Biodiversity  
Climate change  
Human rights  
Water and soil pollution

Air and water pollution

Traceability

NAOH

CS₂

H₂SO₄

Repro-toxic 2  
Neurotoxic 1
Feedstock substitution

Alternative feedstock
- alternative virgin feedstock
- recycled materials
- agriculture residues
Traceability: chain of custody certification

Biodiversity
Climate change
Human rights
Water and soil pollution

Feedstock: better management practices

No illegal logging
No logging in endangered forests
Better Forest management practices
Processing: substitution

- Biodiversity
- Climate change
- Human rights
- Water and soil pollution

Air and water pollution

- Air and water pollution
- REduced impact

- NAOH
- CS₂
- H₂SO₄

Less harmful substances
Ex: NMO

- Repro-toxic
- Neurotoxic
Processing: better chemical management

- Biodiversity
- Climate change
- Human rights
- Water and soil pollution

Air and water pollution

REduced impact

Chemical management systems

- National emission regulations
- BAT
- Closed loop system
- Internal control - Monitoring

Closed Loop

- NAOH
- CS₂
- H₂SO₄

Repro-toxic 2
Neurotoxic 1
About Sustainable Textile Solutions

Sustainable Textile Solutions holds extensive knowledge of dyes and chemicals combined with longstanding expertise on wet processing production techniques.

The dedicated STS team is passionate about environmental protection and creating impact through its assignments.

**STS -Team credentials:**
- 3000 + chemical management assessments
- 100 + WWTP Performance Functionality Assessments
- 1000 + persons trained on Chemical Management
- 200 + Root Cause Analysis
- 40+ countries covered
- ZDHC Contributor and accredited Training Provider
- Higg FEM 3.0 Generalist & Specialist Verifier
Viscose Production Sites Visited in Asia by STS

• China
• Taiwan
• Thailand
• Indonesia
• India
## Sustainability Initiatives per Production Stage

<table>
<thead>
<tr>
<th></th>
<th>WOOD PRODUCTION</th>
<th>PULP PRODUCTION</th>
<th>FIBRE PRODUCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Air Emission</strong></td>
<td>FSC, PEFC, Ecolabel, Canopy</td>
<td>Ecolabel, Higg Index</td>
<td>Local Norms, Higg Index</td>
</tr>
<tr>
<td><strong>Water use</strong></td>
<td>FSC, PEFC, Ecolabel, Canopy</td>
<td>Ecolabel, Higg Index</td>
<td>Ecolabel, Higg Index</td>
</tr>
<tr>
<td><strong>Wastewater</strong></td>
<td>FSC, PEFC, Ecolabel, Canopy</td>
<td>Higg Index</td>
<td>ZDHC</td>
</tr>
<tr>
<td><strong>Chemical Management</strong></td>
<td>FSC, PEFC, Ecolabel, Canopy</td>
<td>Higg Index</td>
<td>Higg Index</td>
</tr>
<tr>
<td><strong>Health &amp; Safety</strong></td>
<td>FSC, PEFC, Ecolabel, Canopy</td>
<td>Higg Index</td>
<td>Higg Index</td>
</tr>
</tbody>
</table>
## Areas of High Concern per Production Stage

<table>
<thead>
<tr>
<th></th>
<th>WOOD PRODUCTION</th>
<th>PULP PRODUCTION</th>
<th>FIBRE PRODUCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Air Emission</strong></td>
<td>N.A.</td>
<td>Chlorine gas</td>
<td>Local ambient air quality not taken into consideration, Carbon disulphide and Hydrogen sulphide, Recovery of CS₂ (45-70%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sox, NOx, Dust, CO and VOCs</td>
<td></td>
</tr>
<tr>
<td><strong>Water use</strong></td>
<td>N.A.</td>
<td>Higg Index, Ecolable</td>
<td>Contaminated water source</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Availability of water source</td>
</tr>
<tr>
<td><strong>Wastewater</strong></td>
<td>N.A.</td>
<td>AOX (Chlorine bleaching)</td>
<td>High temperature, AOX, Disinfection process, Higher ETP load, Zn, Mn, Co, Cr removal, CN⁻ elimination, Sludge drying, High Coliform, Bacteria survival issue in aeration tank</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dioxins</td>
<td></td>
</tr>
<tr>
<td><strong>Chemical Management</strong></td>
<td>Use of pesticides, fertilizers etc.</td>
<td>Bulk chemicals contains impurities (phthalate, APEO &amp; heavy metal)</td>
<td>NPEO’s from utility and ancillary chemicals, Heavy Metal, Amylamines &amp; PCPs from Dope dyed fibres processing, Bulk chemicals contains impurities (phthalate, APEO &amp; heavy metal)</td>
</tr>
<tr>
<td><strong>Health &amp; Safety</strong></td>
<td>Handling and Use of pesticides and fertilizers etc.</td>
<td>Exposure to toxic products and occupational hazards, Handling of NaOH, Sodium Sulphide and other hazardous chemicals</td>
<td>Exposure to toxic products and occupational hazards, Handling of Carbon disulphide, NaOH, NMMO, Chromic acid etc.,</td>
</tr>
</tbody>
</table>
General Challenges Observed

• All major production sites were established 50 – 70 years ago.

• Facilities' are required to adopt latest BAT norms as per the requirements from the different sustainability initiatives.

→ Design and area requirements are key challenges in meeting the requirements of Gas Absorption, Membrane Separation, Noncarbon / carbon Absorption techniques.
Key Challenges Identified in Production

• Facilities are designed to meet local requirements rather than more complex requirements.

• Lack of a unified global norm to follow and adapt weakens business case for major investments.

• Maximum recovery of the non productive outputs requires optimisation of production processes.

• Optimise water usage in production by maintaining effluent load consistent based on current design.

• Zero Liquid Discharge (ZLD) not adopted by the industry.
Key Improvements Implemented in Collaboration with STS Experts

• Implementation of a credible Chemical management system (procurement policies, storage management, risk assessment, hotspot identification, trainings, Non-productive output mapping etc.)

• Reduction of Zn from the wastewater by alkaline precipitation followed by sulphide precipitation, anaerobic sulphate and $H_2S$ reduction process.

• Removal of Cr through precipitation and separation techniques.
Key Improvements Implemented in Collaboration with STS Experts

• Control or elimination of chemical and environmental risks through thorough holistic analysis of chemical usage in input, process and output (e.g. NPEOs, Amylamines, AOX, Heavy metals, phthalates, coliform)

• Ambient temperature as required for effective aeration process in wastewater achieved through temperature mapping of wastewater from source and heat recovery from heat exchangers.
Next Steps: Aim for Closed-loop Manufacturing Standards & Regulations

- Key chemicals recycled through a closed-loop system include:
  - Carbon disulphide (CS$_2$), which needs to be contained and recovered;
  - Hydrogen sulphide (H$_2$S), recovered as sulphuric acid (H$_2$SO$_4$);
  - Zinc sulphate (ZnSO$_4$), recovered from waste water as zinc sulphide (ZnS) and then recycled as zinc sulphate (ZnSO$_4$).

- Condense the exhaust air from spinning process to recover CS$_2$ and recycle it back into the process (EU BAT) (European Commission, 2007).

- Recover CS$_2$ from exhaust air streams through adsorption on activated carbon (EU BAT).

- Apply exhaust air desulphurisation processes based on catalytic oxidation with H$_2$SO$_4$ production (EU BAT).

- Recover sulphate from spinning baths (EU BAT).

Source: Roadmap towards responsible Viscose and Modal fibre manufacturing - Changing markets
REDEFINING LUXURY FASHION
We are a value lead business.

At our core we are MODERN, RESPONSIBLE & CRUELTY-FREE.

We challenge and push boundaries to make luxurious products in a way that is fit for the world we live in today and the future: beautiful and sustainable.

Each decision we make is a symbol of our commitment to defining what the future of fashion looks like. From never using leather or fur and pioneering new alternative materials to utilising cutting edge technologies, pushing towards circularity, protecting ancient and endangered forests and measuring our impact with ground-breaking tools.
WE FOCUS ON RAW MATERIALS

- raw materials: 57%
- processing: 10%
- dying: 14%
- making: 7%
- operations: 12%
# TextileExchange18

## MANMADE CELLULOSE FIBER LANDSCAPE

<table>
<thead>
<tr>
<th>Category</th>
<th>2013</th>
<th>2015</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brands &amp; designers have signed up to the Canopy Style Initiative and committed to eliminate endangered forests from their fabrics</td>
<td>0</td>
<td>60</td>
<td>160</td>
</tr>
<tr>
<td>Trees going into fabric</td>
<td>~70M</td>
<td>~120M</td>
<td>~150M</td>
</tr>
<tr>
<td>Tree-based carbon emissions for manufacturing fabrics</td>
<td>~38M T</td>
<td>~47M T</td>
<td>~53M T</td>
</tr>
<tr>
<td>Viscose Producers with endangered forest sourcing policies</td>
<td>0</td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>Percentage of entire viscose supply audited as low risk</td>
<td>0%</td>
<td>0%</td>
<td>31%</td>
</tr>
<tr>
<td>Companies dedicated to driving fibre alternatives working with Canopy</td>
<td>0</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>Viscose Producers with endangered forest sourcing policies</td>
<td>0%</td>
<td>0%</td>
<td>58%</td>
</tr>
</tbody>
</table>
Viscose
STELLA MCCARTNEY’S MMC WORK 2014 - 2018

2014: signed up to Canopy Style initiative and made a public commitment to ensure that all of our viscose and other cellulose fabrics are sustainably sourced by 2017.

2015: mapping of supply chains and development of traceable supply chain for RTW viscose fabrics.

2016: SMC suppliers undergo and pass Canopy Style audits

2017: focus on MMC recycling innovation
launch of EMF partnership & circular economy commitment
MMC LCA released

2018: advancement of partnerships in MMC recycled feedstocks
LCA COMPARING 10 SOURCES OF MMC FIBER

> LCA carried out by SCS comparing the environmental performance of 10 raw material sources of manmade cellulose fibre.

> The study examines a broad range of environmental issues, from the sourcing of raw materials through to the production of viscose and other MMCs, with the aim of providing key industry stakeholders with resources to make informed fiber sourcing choices.

> This marks the first time LCA has been used to assess global sourcing scenarios for 10 MMC scenarios, including an evaluation of specific forests of origin and terrestrial and freshwater ecosystems.

> The study included MMCF sourced from different global forests, eucalyptus plantations, bamboo, cotton-linters, flax fiber and recycled clothing.
OUR SUPPLY CHAIN

We are able to trace all of our viscose right back to its forest of origin, ensuring that it comes from sustainably managed forests.

Our primary viscose supply chain is fully traceable, transparent and entirely European.

We carefully source pulp from trees that come from an sustainably certified forest in Sweden, which is neither ancient nor endangered. The pulp is then turned into a viscose filament in Germany and then made into fabric in Italy.

This gives us a level of traceability that is unprecedented and ensures we are not directly or indirectly contributing to the destruction of forests.
UNECE/FAO Forestry and Timber Section

Forest for Fashion – Fashion for Forests

Birgit Lia Fain (Altmann)
Associate Economic Affairs Officer

22 October 2018, Milan, Italy
Agenda

1. Who are we?
2. Why are we involved?
3. What exactly do we do?
4. Opportunities?
1. Who are we?
... was established in 1947

... is one of five UN regional commissions

... facilitates greater economic integration and cooperation among its 56 member States
UNECE/FAO Forestry and Timber Section

Regional Scope

The forest in the UNECE region covers:

• 41% of the global total

• 85% certified area

• 60% industrial roundwood
UNECE/FAO Forestry and Timber Section

Working Areas:

- **WA1**: data, monitoring and assessment
- **WA2**: policy dialogue and advice
- **WA3**: communication and outreach
- **WA4**: capacity building
2. Why are we involved?
FASHION
Consumption

Climate Change

Fashion

Forests

Climate Change

Fashion

Forest
Consumption

Fashion

Climate Change

Forests
Anthropogenic CO2 emissions (2007–2016)

Sources

88%
34.4 GtCO₂/yr
Fossil fuel burning, cement

12%
4.8 GtCO₂/yr
Deforestation, land-use change

Sinks

46%
17.2 GtCO₂/yr

30%
11.0 GtCO₂/yr

24%
8.8 GtCO₂/yr
Negative carbon emissions needed → forests and their products
1m³ of wood stores 1 ton of carbon
Wood-based fibers produce 15 times less carbon emissions than polyester
Cotton – Water – Forests
3. What exactly do we do?
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Forest for Fashion
UNECE/FAO Forestry and Timber Section

Forest for Fashion

Movie: «Made in Forests»

https://www.youtube.com/watch?v=Ko8qCyoZ-Mg
UN Alliance for Sustainable Fashion

HLPF 2018
4. Opportunities?
Thank you!

UNECE Forestry and Timber: [www.unece.org/forests](http://www.unece.org/forests)

Birgit Lia Fain (Altmann)
Associate Economic Affairs Officer
birgit.altmann@un.org
1 – Forests and MMC (Canopy & FSC)

2 – Alternative Technologies for MMC (FFG & Spinnova)

3 – Chemicals and MMC (ZDHC & Lenzing)

4 – Closing the loop on MMC (Stella McCartney & Canopy)

- Be constructive: "and" instead of "but"
- Make sure everyone gets the chance to speak
- One discussion at a time
- Phones off please
FORESTS

UNECE/FAO Forestry and Timber Section

Forest for Fashion

Movie:
«Made in Forests»

https://www.youtube.com/watch?v=Ko8qCyoZ-Mg
- Please place your priority points

- Please leave your ideas and input

- We will contact you on next steps, leave your business card
1 – Forests and MMC (Canopy & FSC)

2 – Alternative Technologies for MMC (FFG & Spinnova)

3 – Chemicals and MMC (ZDHC & Lenzing)

4 – Closing the loop on MMC (Stella McCartney & Canopy)
THANK YOU ALL AND THANK YOU TO OUR 2018 MMC ROUND TABLE SPONSORS:

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