



Tree to Textile

A photograph of three spools of white thread with wooden bobbins, arranged diagonally from the top left to the bottom right. The spools are filled with a fine, white thread. The background is a plain, light color.

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This is TreeToTextile

TreeToTextile AB is a Swedish registered company, reg.no 556989-2648.

The company was founded 2014, by Inter IKEA Group, H&M Group, entrepreneur Lars Stigsson (LSCS Invest AB), and in 2018 Stora Enso joined as fourth owner.

The joint effort derives from the question *“how can we accelerate the development of a more sustainable and cost-efficient fiber, for a broad market?”*.

The innovation activities started as Research & Development projects (2010-2014) and successfully advanced further by operations and fiber production in a pilot wet spinning line (2014-2020). Next step is upscaling and verifying the process technology and fiber production in industrial settings via a demonstration plant and testing of produced fiber in consumer products (Spring 2021).

The TreeToTextile Board of Directors has four directors – one each for each owner – plus four deputies:

DIRECTORS:

- Chairwoman; Roxana Barbieru, Vice President Emerging Businesses and Alliance Management Biomaterials, Stora Enso
- Lars Stigsson, CEO, LSCS Invest
- Annica Karlsson, Innovation Ventures Manager, Inter Ikea Group
- Joel Ankarberg, Head of Strategy and Transformation, H&M Group

DEPUTY DIRECTORS:

- Markus Mannström, Head of Biomaterials Division, Stora Enso
 - Christian Stigsson, LSCS Invest
 - Nils Månsson, Category Manager Textile Products, Inter IKEA Group
 - Erik Karlsson, Investment Manager, H&M Group
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TreeToTextile® is a registered trademark of TreeToTextile AB.

The Purpose

The purpose of the company is to contribute to the sustainable development of the textile industry, by developing and industrializing a new innovative Man-Made Cellulosic Fiber (MMCF) technology – with a superior sustainability profile, at an attractive cost level. The vision for TreeToTextile is: Better textiles in harmony with nature, to all.

TreeToTextile is committed to the sustainable development of the textile industry and promotes sustainable sourcing and management across the value chain. TreeToTextile fully supports the concept of a circular economy. TreeToTextile is a member of Textile Exchange¹ and a supporting organization to United Nations Framework Convention on Climate Change (UNFCCC) Fashion charter, in the Raw materials working group², where the company contributes to the global sustainable development of raw materials.



The textile fiber

The new TreeToTextile fiber is a regenerated cellulosic fiber, sustainably produced and sourced from renewable raw materials from sustainably managed forests.

The fiber has high versatility and is assessed and deemed suitable for a broad range of market applications. Its fiber properties and hand-feel are of a natural fiber, with similarities to both cotton and viscose.

¹ <https://textileexchange.org>

² <https://unfccc.int/climate-action/sectoral-engagement/global-climate-action-in-fashion/fashion-industry-charter-for-climate-action/participants-in-the-fashion-industry-charter-for-climate-action#eq-2>

The Technology



“The process includes a recovery system that reuses the water and chemicals.”

The TreeToTextile technology is a textile fiber process. It is a wet-spinning process for regenerating cellulose into staple fibers, ready for further industrial textile manufacturing processes, like spinning into yarn for the textile industry.

The process treats wood-based dissolving pulp in a cold alkaline solution, transforming it into a cellulosic solution, a spin-dope, which is spun into long filaments and cut into staple fibers. The process includes a recovery system that reuses the water and chemicals.

The process is developed to achieve a fiber that has a strong sustainability profile, is scalable, and can be produced at a low manufacturing cost. It is designed to have low energy demand and low chemical consumption.

The technology is invented in Sweden, and before global commercialization, the process will be further refined in an industrial-sized demonstration plant.

The technology of TreeToTextile is protected by several patents.



The sustainability performance

reduction
of at least
33%
energy

reduction
of at least
80%
water

reduction
of at least
70%
chemicals

The cellulose, as raw material, is biobased and from renewable sources. The chemicals used in the process are standard bulk chemicals, commonly used in the traditional process industry and compliant with EU REACH³ (Registration, Evaluation, Authorization and Restriction of Chemicals) legislation.

The process chemicals are restored and recycled within the process.

Looking at the sustainability targets, when benchmarked to the production of conventional textile fibers, the TreeToTextile technology would mean less use of energy, chemicals, and water. It is assessed vs conventional viscose production to enable **reduction of at least 33 percent energy, at least 80 percent lower water usage, and at least 70 percent less chemicals.** Compared to market average cotton, it would mean **significantly lower water consumption, and no use of pesticides, herbicides, or fertilizers.** TreeToTextile is still refining its process and with the help of the demonstration plant, the intent is to further optimize the environmental performance and minimize energy and chemical use.

TreeToTextile has performed a Life-Cycle-Assessment study⁴ (LCA), which has been third-party verified by Quantis (2021)⁵. The data points are based on current operations in pilot scale, which are modelled into industrial scale figures, and compared with available published LCA data.

³ echa.europa.eu/regulations/reach/understanding-reach

⁴ Hildenbrand & Roos (2020)

⁵ See Executive Summary & Verification statement by Quantis (2021)

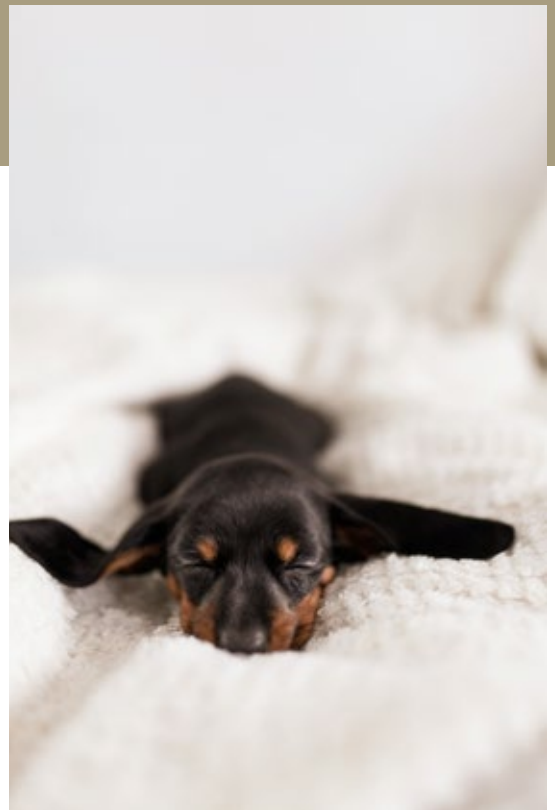
Sustainable sourcing of cellulose

TreeToTextile promotes the use of cellulose from sustainably sourced and managed forests, such as FSC⁶ or PEFC⁷ certified. This wood is 100% traceable to its origins, the forests harvested in productive areas are replanted, and biodiversity is preserved by for example protecting valuable areas and species.

TreeToTextile advocates a global forest positive development, i.e., sustainable forest management that aims to eliminate forest degradation and deforestation, and ensure protection, restoration and regeneration, as well as regenerative projects on degraded land, deforested areas, and agriculturally cultivated areas.

⁶ fsc.org/en

⁷ www.pefc.org



The Demonstration Plant

- The demonstration plant will enable industrial upscaling of the TreeToTextile technology.
- The construction of the plant is estimated to take approximately one year, with an estimated start of operations during Spring 2022 for upscaling operations.
- The estimated cost for construction is approximately €35 million.
- The investment is financed by TreeToTextile's owners; Inter IKEA Group, H&M Group, Stora Enso and LSCS Invest/Lars Stigsson, and a grant from Swedish Energy Agency of €7,6 million.
- The plant will have a production capacity of approx 1500 metric ton fibers per year. The produced fibers will be utilized for market preparation activities.
- The plant will be constructed within the facility of Stora Enso's Nymölla mill who will host TreeToTextile during its operations and upscaling phase.
- For the demonstration plant, dissolving pulp produced from certified wood will be used. The raw material is renewable, 100% traceable to its origins, and comes from sustainably managed forests.
- Facts about Nymölla Mill; a pulp and paper mill that produces chemical pulp and wood-free uncoated paper. It was founded 1962, employs 540 people and has an annual capacity of 340,000 metric tons of pulp and 475,000 metric tons of paper. The mill is located in southern Sweden, in Bromölla municipality, in Skåne region. Address: Nymölla bruk, Nymöllavägen, 295 73 Nymölla, Sweden.



”The raw material is renewable, 100% traceable to its origins, and comes from sustainably managed forests.”

The Company

TreeToTextile AB head office is located in Stockholm, Sweden.

The company has four employees – CEO; Sigrid Barnekow, CTO; Olli Ylä-Jarkko, Head of R&D; Åsa Östlund (PhD), and Head of Textile Development and Design; Ida Alnemo.

The organization operates in an extended team of 35-40 persons in an international network of partners, consultants and owners' specialists.

For the demonstration plant managers and plant operators will be recruited.

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