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The Swedish Wool Initiative

Paving the Way to Zero Waste

Photo: Axfoundation

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Summary

Sweden imports over 1,700 tons of wool yearly. At the same time, less than 50% of all the wool produced by Swedish farmers is utilized. This is a huge waste of resources that could provide the Swedish industry with a regionally supplied, bio-based, and recyclable material. In The Swedish Wool Initiative, stakeholders from across the value chain have successfully collaborated to build system capacity, increase the use of Swedish wool, and drive the transition to a more sustainable and circular textile industry.

The development of the Swedish Wool Standard has enhanced system capacity by incorporating work practices and a national classification system, fostering consistent communication throughout the value chain and facilitating trade. The project has increased understanding of value chain processes and promoted closer collaboration among stakeholders. Business modeling and sustainability analysis have deepened the knowledge of what it takes to make Swedish wool profitable and competitive.

By developing innovative products and a design guide for the circular use of Swedish wool, the project has actively contributed to the transition to a sustainable and circular textile industry. Additionally, the project has demonstrated traceability of the material from wool brokers to the finished product. The project has systematically shared its results and lessons to engage and lay the groundwork for collaborations and further development even after the project's conclusion.

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Content

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Paving the Way to Zero Waste

Sweden imports over 1,700 tons of wool yearly. At the same time, less than 50% of all the wool produced by Swedish farmers is utilized. This is a huge waste of resources that could provide the Swedish industry with a regionally supplied, bio-based, and recyclable material. In addition, wool is also naturally antibacterial, dirt-repellent, and flame-retardant. The unique composition of this raw material means there is no need to add chemicals such as PFAS or biocides to achieve these highly desirable features. This is an enabling factor for circular material flows.

The Swedish Wool Initiative, a project initiated by Filippa K, and led by Axfoundation, gathered actors from across the value chain to find solutions and contribute to the vision of zero waste of Swedish wool.

Project objectives

1. Build system capacity
2. Scale up the use of Swedish wool
3. Contribute to the transition to a sustainable and circular textile industry.

Photo: Axfoundation

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Establishing a Common Language

Background

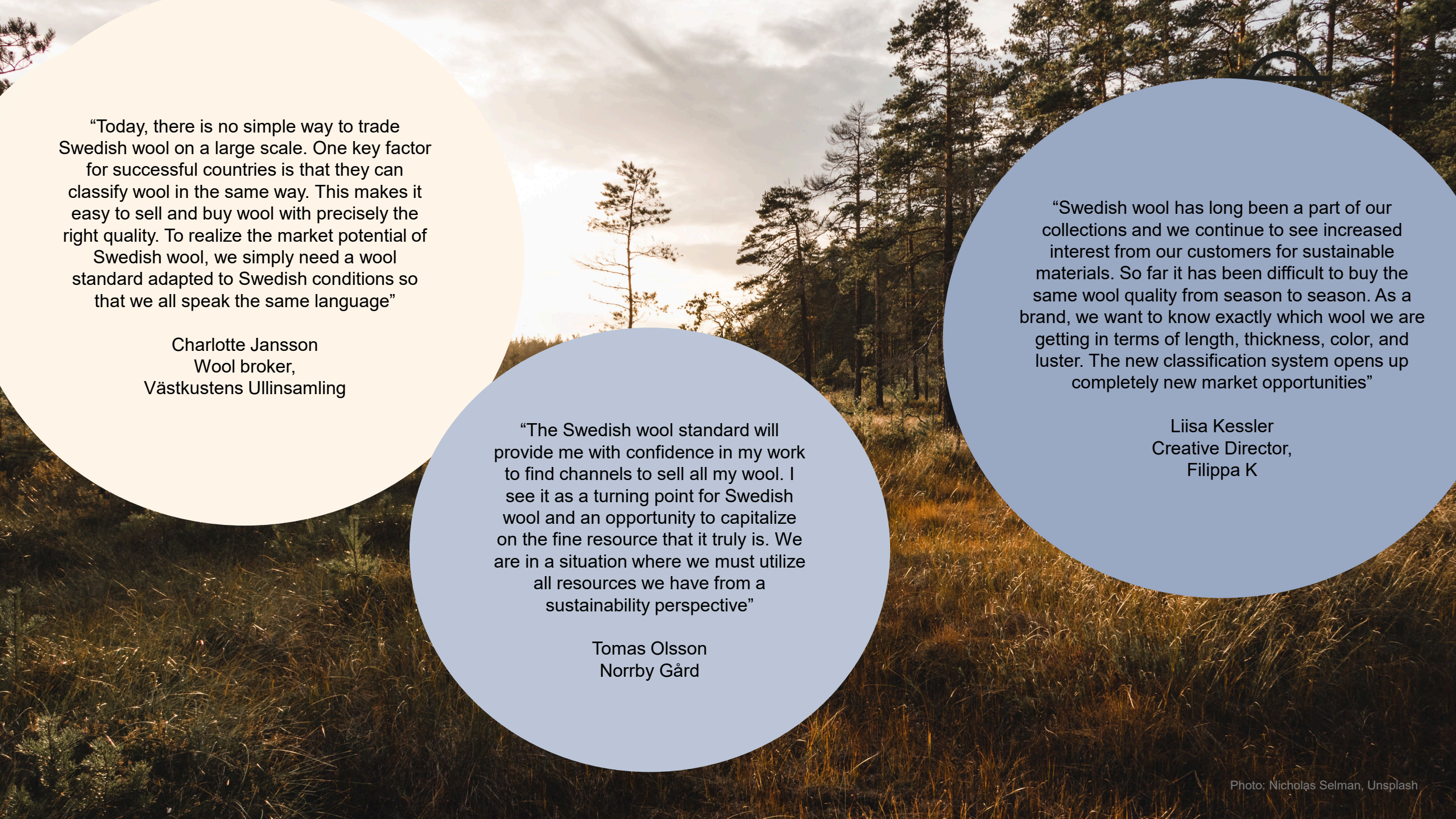
The Swedish wool market encompasses numerous sheep breeds, each presenting a wide array of wool types and qualities. The lack of a common language among actors in the wool value chain was identified as one of the main bottlenecks to be able to scale the use of Swedish Wool. It hindered wool producers to effectively communicating the qualities of the raw material they provided. For buyers, the lack of a system for quality assurance and classification meant that they had little control over what they were buying.

The Solution

Actors from across the value chain came together in the creation of The Swedish Wool Standard: A framework for quality assurance in each step from wool production to sales, including a classification system for Swedish wool. Through classification, even smaller quantities of wool from small-scale farms spread across the country can be gathered, classified collectively, and subsequently matched with the demands of buyers. The standard simplifies the process of selling and purchasing high-quality Swedish wool, opening up new possibilities and new business opportunities.

In 2022, a national organization for Swedish wool “Arena Svensk Ull” was started, independently from the project. With the ambition to increase the use of Swedish wool and with representatives from different parts of the value chain, the long-term ownership of the Swedish Wool Standard was then handed over to Arena Svensk Ull.

Learn more about The Swedish Wool Standard in Swedish here and English here.



“Today, there is no simple way to trade Swedish wool on a large scale. One key factor for successful countries is that they can classify wool in the same way. This makes it easy to sell and buy wool with precisely the right quality. To realize the market potential of Swedish wool, we simply need a wool standard adapted to Swedish conditions so that we all speak the same language”

Charlotte Jansson
Wool broker,
Västkustens Ullinsamling

“The Swedish wool standard will provide me with confidence in my work to find channels to sell all my wool. I see it as a turning point for Swedish wool and an opportunity to capitalize on the fine resource that it truly is. We are in a situation where we must utilize all resources we have from a sustainability perspective”

Tomas Olsson
Norrby Gård

“Swedish wool has long been a part of our collections and we continue to see increased interest from our customers for sustainable materials. So far it has been difficult to buy the same wool quality from season to season. As a brand, we want to know exactly which wool we are getting in terms of length, thickness, color, and luster. The new classification system opens up completely new market opportunities”

Liisa Kessler
Creative Director,
Filippa K

Photo: Nicholas Selman, Unsplash

Photo: Axfoundation

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Bridging the Gap Between Wool Producers and the Industry

Background

The Swedish wool market, mainly comprised of smaller farms with less than 50 sheep, presents challenges for industries accustomed to buying larger volumes of imported wool. The absence of a standardized classification system makes engaging with individual farms time-consuming. Inconsistent quality, insufficient quantities, and unreliable supply further complicate procurement.

Sheep owners face challenges due to modest volumes, as costs of maintaining high-quality wool often exceed revenue from sales. The lack of economic incentives hinders extensive utilization of Swedish wool. Despite these obstacles, many sheep owners recognize wool's intrinsic value and express a desire to explore effective utilization avenues beyond its economic aspects.

The Solution

The project has delved into and expanded upon the key role of wool brokers, serving as a crucial link between wool producers and the fashion and textile industry. The dialogue involved key players who are actively engaged in collecting wool from their network of farms, along with contributors from various points across the value chain. Subject matter experts, possessing both domestic and international experience in wool collection and classification, also contributed to the discussions. A significant outcome of this collaboration is the establishment of the Swedish Wool Standard. **This standard not only offers a unified language for all wool brokers to communicate the characteristics of raw materials to the market but also outlines operational methods to ensure the consistently high quality of raw materials from wool production to sales**.

By centralizing the collection of wool and enabling the consolidation of wool from multiple farms, which is then classified according to a shared standard, wool brokers can supply larger volumes of more uniform quality. This not only meets the volume requirements for cost-effective scouring (washing) outside of Sweden, where the minimum batch size is two tonnes, but makes the Swedish wool more appealing to companies in the fashion, outdoor, and home textile sectors.

The development of the Swedish Wool Standard establishes a foundation for the ongoing growth and scalability of existing wool brokers in Sweden. Additionally, it opens doors for new entrants to the market, fostering continuous development and expansion.

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Scaling up the Swedish Wool Collection System

Background
The development of a profitable system for the collection of wool was identified as a key lever for scalability by all stakeholders in the value chain for Swedish Wool.

Geographical Analysis & Scalability
A geographical analysis revealed that Sweden has a sheep population of 262,000 (excluding lambs). Notably, 92.5% (242,000) of these sheep are situated south of Sundsvall, with 86.6% (227,000) located south of Dalarna. Estimating an average wool yield of 3 kg per sheep, this translates to an annual wool availability of 786 tons from rams and ewes (2020): 727 tons south of Sundsvall and 681 tons south of Dalarna.

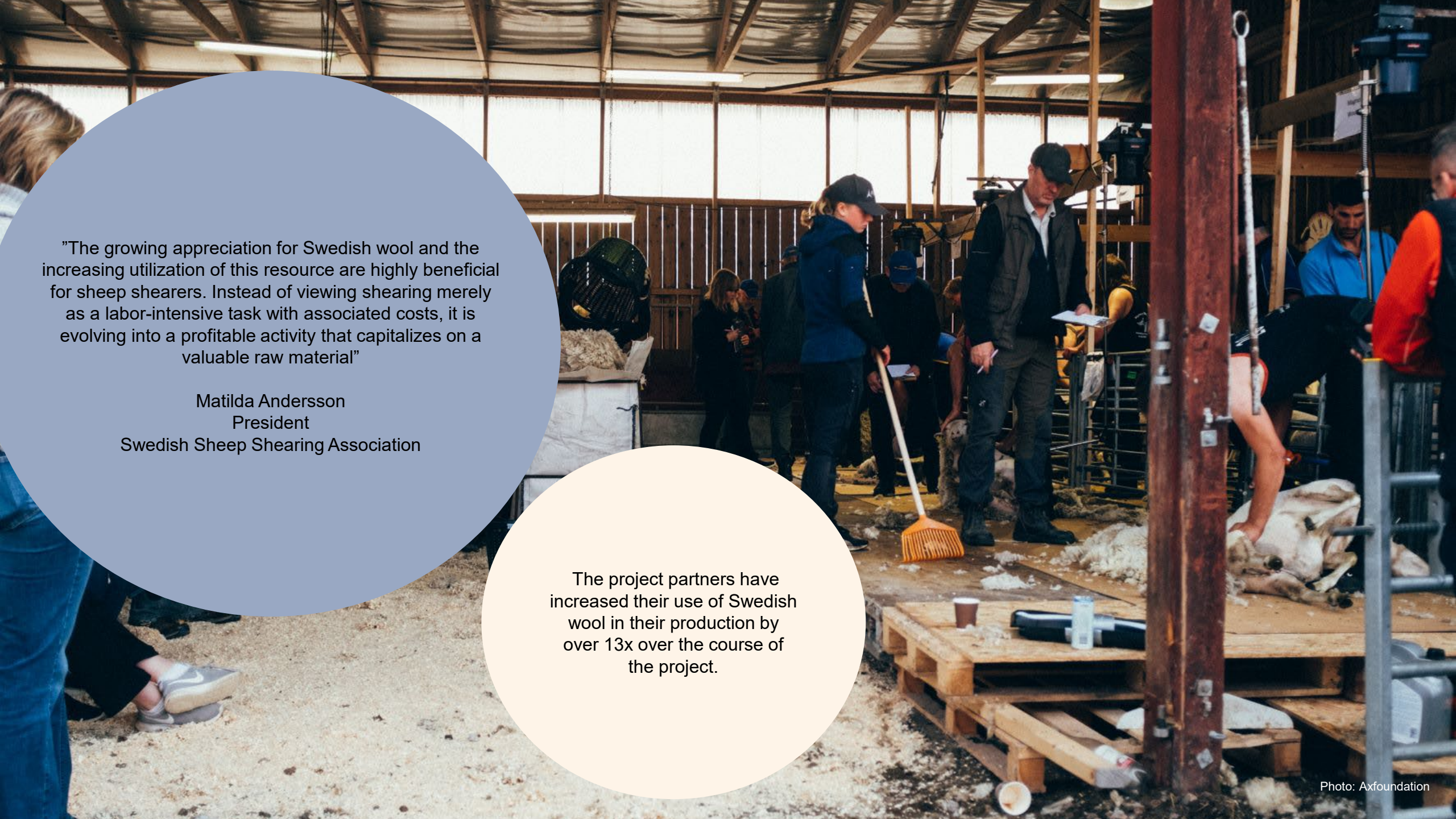
Although the prevalent farm size ranges from 1 to 49 sheep, the majority of sheep are found on farms with over 50 sheep. Specifically, there are 109,000 sheep distributed across 6,706 smaller farms and 153,000 sheep on 1,229 larger farms. Drawing insights from the geographical distribution and estimated volumes, the analysis suggests the potential for six collection points in Sweden, three more than the current project involves. These collection points would be strategically located to efficiently gather approximately 100 tons of wool within a 150 km radius of each point. Potential additional locations include Östergötland, Västra Götaland, and the vicinity around Lake Mälaren.

The analysis of costs from initial wool production to collection revealed a potential for the current wool brokers to scale up from around 40 tons annually to 100 tons in the future. A collection point managing 100 tons annually would require a full-time employee for tasks such as quality control, classification, and baling. However, the bale press used in packing wool would only operate at about 30% capacity in such a scenario. This implies that the wool brokers could significantly expand collection if the raw material supply increases through expanded collection or more farms with additional sheep in the future.

Optimizing Collection Points
The main costs for a collection point are labor costs, purchase of raw wool, and bale press (purchase and running costs). For a collection point to have a viable utilization rate of both labor and the bale press, an optimal amount of wool needs to be handled at each collection point. Each location needs a bale press that has a good utilization rate. 100 tons per year corresponds to a utilization rate of about 30%, i.e., the collection points could scale even more if more wool was available. Each collection point needs at least one full-time employee taking care of all practical aspects, such as receiving wool, classifying wool, and baling wool for further transportation to scouring (washing). One full-time employee could handle 100 tons of wool each year, having time to receive, classify, bale, and handle the wool. Increasing the amount of handled wool would be possible based on bale press utilization, but more employees might be needed. A collection point handling 100 tons of wool needs at least 5 professional shearers to handle shearing in the area surrounding the wool station, i.e., a total of 30 shearers needed to handle 92.5% of all sheep.

Another notable challenge involves the logistics and transportation costs associated with handling wool. Efficient transport is crucial, necessitating the consolidation of volumes. A proposed solution entails combining collection points with smaller hubs to optimize transportation and minimize associated costs.

[1] Jordbruksverket, 2020



”The growing appreciation for Swedish wool and the increasing utilization of this resource are highly beneficial for sheep shearers. Instead of viewing shearing merely as a labor-intensive task with associated costs, it is evolving into a profitable activity that capitalizes on a valuable raw material”

Matilda Andersson
President
Swedish Sheep Shearing Association

The project partners have increased their use of Swedish wool in their production by over 13x over the course of the project.

Photo: Axfoundation


Photo: Maskot

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Reversing the Design Process

Background

Circular design represents a transformative approach in the fashion industry, aiming to create a closed-loop system that minimizes waste and environmental impact. At its core, circular design encourages a shift from the traditional linear model of "take, make, dispose" to a more sustainable, regenerative cycle. Starting with the raw material is crucial in the journey towards circularity. Raw materials form the foundation of any textile product, and the choice of raw material has a significant impact on the environmental footprint of the product throughout the entire lifecycle.

Reversing the design process and starting with the raw material at hand – Swedish wool – turned out to be both challenging and rewarding for the fashion, outdoor, and home textile companies in the project. They had collectively been grappling with similar challenges in sourcing and processing Swedish Wool. Sourcing substantial quantities of high-quality wool posed difficulties, and many spinners faced the unfamiliarity of working with fibers differing from the standardized imported wool. Furthermore, many designers were accustomed to starting with the product they envisioned incorporating into their collections rather than the material.

The Solution

The reversal demanded these companies to increase their knowledge about the fibers and wool production, reassess internal processes, and work closer with their suppliers.

Klippan Yllefabrik **pioneered a new innovative yarn based on Swedish Wool that would normally be discarded due to a higher level of vegetable matter** (organic material) than what is normally accepted in a spinning process. This yarn served as the cornerstone for further prototyping within the project. Simultaneously, another avenue explored the use of production spill in the yarn-making process. **These dual approaches yielded prototypes ranging from knitwear to rugs**. In parallel, the companies worked with their suppliers to further develop their range of products based on Swedish wool which resulted in **products that reached the end consumers: sweaters, coats, suits, blankets, and a Swedish wool filling for jackets**.

The accomplishment of delivering products crafted from Swedish wool to customers, coupled with the simultaneous establishment of a new value chain, is truly remarkable. This success would not have been possible without the full commitment and willingness of the companies to venture down the less-traveled path. Another pivotal success factor lay in the collaborative environment, where market competitors transcended rivalry to share knowledge and resources, fostering mutual support on this transformative journey. **Together, the companies have increased their yearly purchase volumes of Swedish wool by over 13 times**.

Starting with raw materials not only laid the groundwork for collaboration, responsible production, and reduced environmental impact but also produced a variety of high-quality products. Each product unfolds a compelling story from farm to final product, presenting a stark contrast to the prevailing fast fashion storyline.

Example from Klippan Yllefabrik: Creating Yarn from Discarded Wool

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The finished yarn was not only utilized by Klippan Yllefabrik but also made available for other partners to use in their prototyping processes.

White wool with lots of vegetable matter that would normally be discarded.
Micron: 30-35

Västkustens Ullinsamling

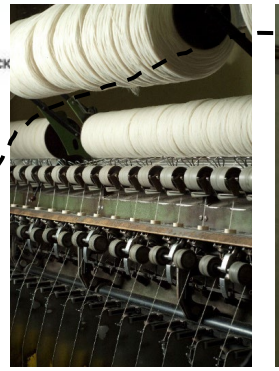
Scouring and combing in Poland

FJÄLL RÄVEN

TIGER OF SWEDEN

1903

Filippa K



KLIPPAN
sedan 1879

Worsted spinning in Lithuania.
Yarn: Nm12/2

Photo & model: Science Park Borås

Example from Tiger of Sweden: Process from Raw Material to Finished Garment

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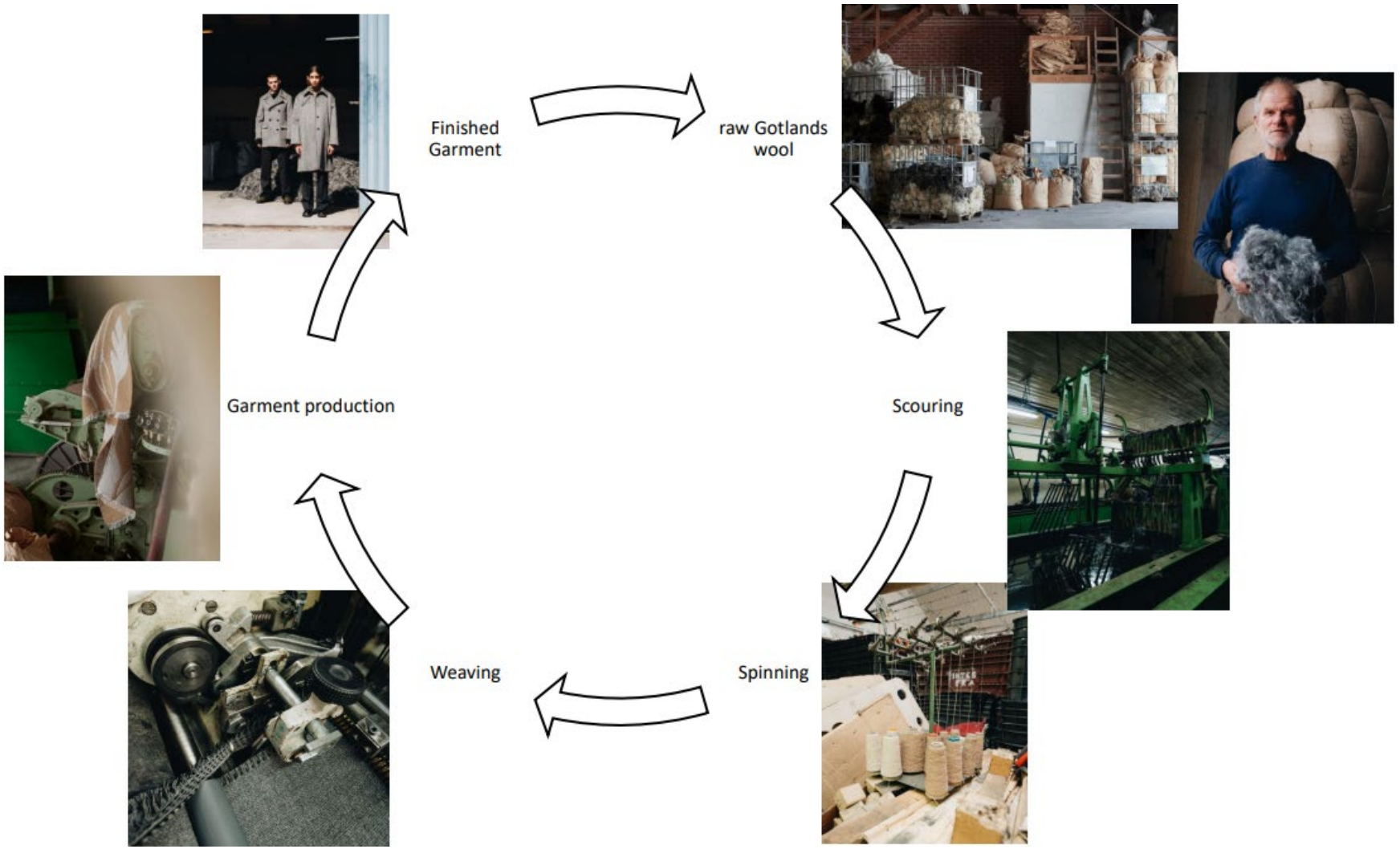
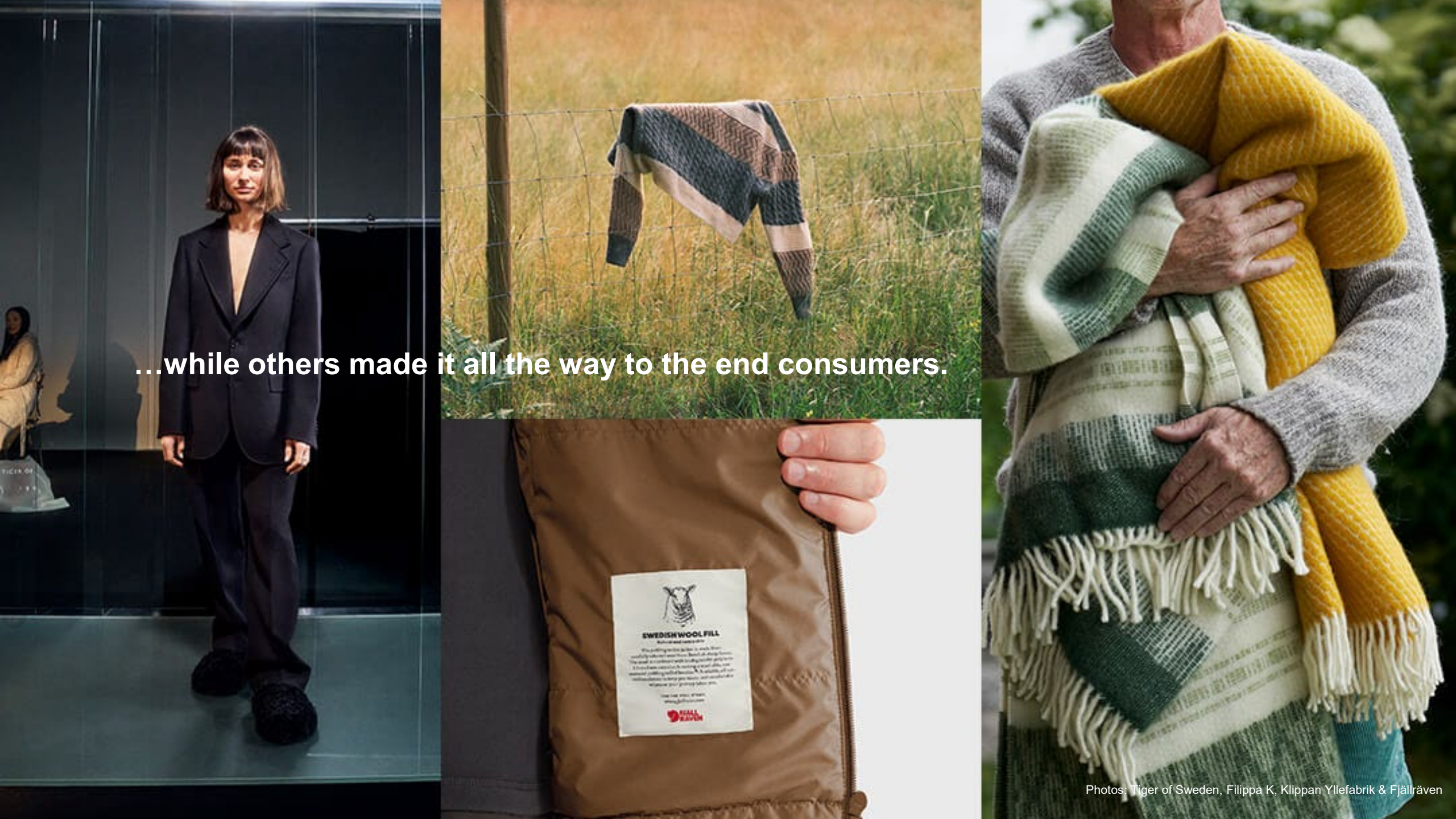


Photo & model: Tiger of Sweden

Some of the products are still in the prototype stage…

Photo: Science Park Borås,
Anna Sigge & Axfoundation



Photos: Tiger of Sweden, Filippa K, Klippan Yllefabrik & Fjällräven

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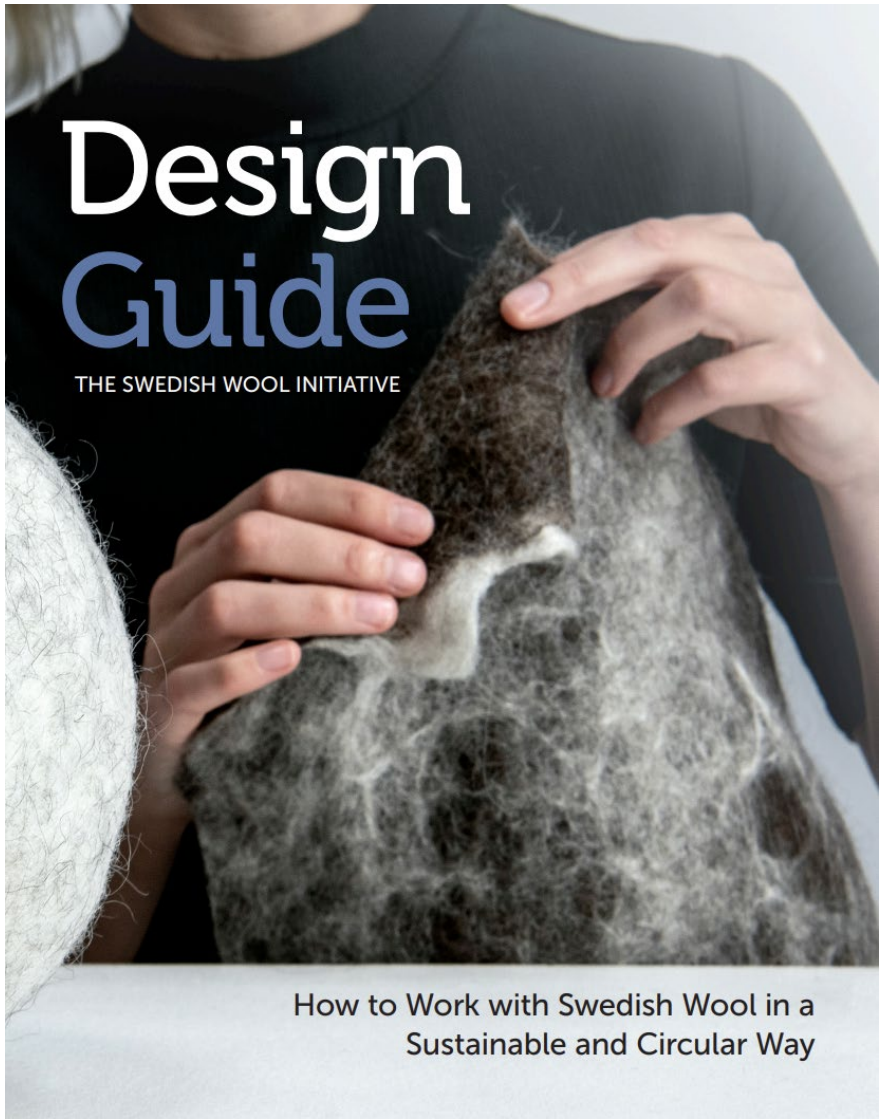
The Design Guide

In a transformative shift towards a circular economy in the textile and fashion industry, Swedish wool emerges as a precious resource. This guide, crafted by The Swedish Wool Initiative, serves as a guide for those eager to embrace sustainable alternatives. Designed for both novices and experienced practitioners, this guide delves into actionable steps for design and product development, intertwining with discussions on circular business models and insightful lessons learned by industry pioneers.

Embark on a journey that unravels the potential of Swedish wool, a natural and sustainable alternative poised to redefine the textile landscape. As the threads of design, materials, and business models weave together, let Swedish wool be your guide towards a more sustainable and circular future in the textile and fashion industry.

Get started and explore the Design Guide by Science Park Borås here.



“The project has been very innovative and exciting to be a part of. Our goal is always to tailor the product to align with the qualities of Swedish wool, rather than molding the fiber to conform to the product”

Madeleine Kawasaki
Sustainability and Innovation Manager,
Tiger of Sweden

“We have learned that connecting and collaborating with each other in the production chain can produce endless possibilities. Often in this industry, one stakeholder doesn’t talk to the other, but when you start to open up and become transparent, the possibilities are much greater. You find people who have so many different talents and ideas along the way who are happy to share their knowledge to create a stronger outcome.”

Josephine Norris
Senior Product Developer, Filippa K

“Wool is a by-product of meat production and has largely not been used in the past. Since sheep are raised for their meat, the production of wool does not require any additional resources. Therefore, every kilogram of wool that we can use instead of throwing it away contributes to a more circular society”

Gösta Magnusson
Chairman of the Board and Senior Advisor,
Klippan Yllefabrik

Foto: Axfoundation


Photo: Annica Löwenadler Ekstedt

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Sustainability Benefits of Swedish Wool

- **Climate impact**: Swedish wool production may have lower carbon footprint than imported wool, but making precise comparisons is hard. Recycled wool has a considerably lower impact than virgin wool. A parameter that increases climate impact of Swedish wool is that sheep are kept indoors and provided supplementary feed during the winter months.
- **Water usage**: Production of Swedish sheep meat have lower water usage compared to imported meat from countries such as Ireland and New Zealand. Assume this is the same for wool production, but wool processing excluded.
- **Animal welfare**: Swedish animal welfare regulations are stricter than in other countries, leading to lower antibiotic usage, fewer medical interventions etc
- **Land use**: Swedish sheep farms generally use more land for grazing than for crop cultivation, contributing to increased biodiversity by preserving diverse landscapes and habitats.
- Learn more by reading the report from IVL Swedish Environmental Research Institute here

Photo: Fjällräven

Foto: Axfoundation

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Promoting Responsible Production and Enabling Circularity

Background

Traceability is crucial for the fashion and textiles industry as it enhances transparency and accountability throughout the supply chain. It involves tracking the journey of raw materials, production processes, and final products, allowing stakeholders and consumers to access comprehensive information about a product's origin.

Traceability ensures that materials are ethically sourced, promoting fair labor practices and environmentally responsible production methods. By tracing each step of the manufacturing process, companies can maintain and improve the quality of their products and make more informed decisions about sustainable practices and reduce their negative impact. In an era where consumers are increasingly concerned about the ethical and environmental aspects of their purchases, traceability provides a means for companies to demonstrate transparency and for customers to access information about the products they buy.

The Solution

In the Swedish Wool Initiative, traceability from raw material to final product was demonstrated by Filippa K, Klippan Yllefabrik and Västkustens Ullinsamling. The wool was collected from farms that are part of Västkustens Ullinsamling's network. To reach the critical volume of two tonnes to be able to send to wool for scouring (washing) at the industrial scale scouring facility in Poland, wool from several smaller farms had to be combined. This resulted in traceability for the final product back to Västkustens Ullinsamling that guarantees that the wool is collected from their documented network of partners.

The information about the raw material was communicated to customers together with information about the supply chain and care instructions, both online and in-store through a QR-code.

Example from Filippa K: Information about the raw material, suppliers and care instructions in-store and online

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In-store solution
with QR-code

Example from Klippan Yllefabrik: Information about the raw material, suppliers and care instructions online

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FREJA

1 140 kr

COLOR — Bärnsten

LÄGG I VARUKORGEN

Vår pläd Freja är tillverkad av lokalt producerad svensk ull som vi köper in med hjälp av Charlotte och Calle på Västkustens Ullinsamling. Calle har tidigare varit svensk mästare i fårklippning och hjälper oss att klippa ullen som vi har valt att använda till denna pläd. Pläden har ett klassiskt och stilfullt mönster med dekorativa fransar på kortsidorna. Freja passar i hemmets alla rum och är skön att lägga om axlarna en kylig kväll.

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Sharing Knowledge & Insights

Extending the reach of knowledge and learnings beyond the project team has been a priority throughout the project. The project has been presented in a range of different forums – from national television to wool-, sustainability- and leadership conferences, academic papers, industry publications, and podcasts.

One of the highlights was the conference arranged by We Don't Have Time in parallel to the United Nations Stockholm +50 conference, where the project was presented to an international audience of several million. The main results have been summarized in a film, and the final webinar will be open to everyone interested in learning more about the project and Swedish wool.

Awards and Nominations

- The Swedish Wool Initiative receives The Jury's Honorable Mention at the annual Recycling Gala 2022. The award is presented by the magazine Recycling in partnership with Avfall Sverige (Waste Sweden) and Återvinningsindustrierna (Recycling Industries).
- Nominated to Stockholm Fashion District's Encouragement for Action Award 2023
- Nominated to Habit's Sustainability Award 2023

Explore the project and delve into the highlights and results showcased in our film. Check it out here!

Photo: Tiger of Sweden

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Conclusion & Recommendations

In The Swedish Wool Initiative, stakeholders collaborated to establish the Swedish Wool Standard, with a focus on securing high-quality raw material and a common trade language. This process not only resulted in the standard but also fostered a better understanding of value chain processes and promoted closer collaboration among stakeholders. The integration of business modeling and sustainability analysis has further enriched the understanding of the requirements for making Swedish wool both profitable and competitive. The project's active contribution to a sustainable textile industry is evident through the development of innovative products and a circular design guide. Furthermore, the project successfully showcased traceability, illustrating the journey of the material from wool brokers to the finished product.

However, in our pursuit of ensuring zero percent waste of Swedish wool, there remains unfinished work. To guide future endeavors, we offer the following recommendations:

1. **Sustain and Enhance the Swedish Wool Standard:** The developed standard has undergone testing and implementation, but its long-term ownership, continual development, and refinement based on user feedback are crucial for its effectiveness.
2. **Address Cost Challenges in the Wool Supply Chain:** Farmers face challenges in receiving sufficient compensation for high-quality wool, while textile brands find it difficult to justify higher prices compared to imported wool. Process improvements, from production to sales, coupled with increased volumes, are essential to cost reduction. Simultaneously, storytelling and heightened consumer awareness can validate premium pricing.
3. **Scale Up and Expand Wool Broker Networks:** Business modeling reveals potential scalability for existing wool brokers, with opportunities to expand from approximately 40 to 100 tonnes per year. Introducing new brokers in sheep-dense areas lacking representation is also viable.
4. **Advance Digital Traceability Solutions:** Continue the development and implementation of digital solutions to enhance traceability, ensuring full transparency from production to the independent farm.
5. **Conduct Full-Scale Life Cycle Analysis (LCA):** Undertake a comprehensive LCA analysis to substantiate sustainability claims for Swedish wool.
6. **Innovate Utilization of Wool Qualities:** Continue to explore opportunities to innovate with wool qualities unsuitable for spinning. Extend applications to adjacent industries, such as interior textiles, furniture, and padding, especially focusing on higher microns and medium to high amounts of vegetable matter.

The journey towards a sustainable, waste-free utilization of Swedish wool requires sustained effort and continued collaboration across the industry. These recommendations aim to guide further progress in aligning the project's goals with the broader vision of a circular and environmentally conscious textile sector.

Thank you!

On behalf of Axfoundation, we want to express our sincere gratitude to all the project members and contributors who have played a crucial role in this initiative. Your unwavering dedication and openness to explore new avenues with us have proven fundamental in steering our collective efforts toward building a more sustainable and circular textile industry.

We would also like to extend our thanks to Vinnova Sustainable Industry for their support. Your role has been pivotal, serving as a key catalyst in transforming our shared vision into a tangible reality. Thank you for your invaluable contributions to this journey.

Johanna Olofsson Behrman & Johan Sidenmark
Project Managers, Axfoundation

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Author: This document was produced by
Johanna Olofsson Behrman, Axfoundation..

Axfoundation is an independent, non-profit organization that innovates and accelerates practical solutions for a sustainable society. We believe in entrepreneurship as a force for change and in broad collaborations with relevant actors in society. Together with over 200 partners, we tackle practical issues related to the things we buy, the food we eat, and the resources we use.

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info@axfoundation.se
www.axfoundation.se

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SVENSKA FÅRKLIPPARFÖRBUNDET Sedan 2008

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CHALMERS INDUSTRITEKNIK

SCIENCE PARK BORÅS
FROM IDEA TO SUSTAINABLE IMPACT

LE UllKonsult
För högre standard

TIGER OF SWEDEN
1903

KLIPPAN sedan 1879

SVENSKA FÅRAVELSFÖRBUNDET

FJÄLL RÄVEN

ARENA SVENSK ULL

Circularista

trustrace

Hushållnings sällskapet

ANIMALIA

LANTBRUKARNAS RIKSFÖRBUND

GÖRVÄLNLAMMET
bli varmare - bli färfarmare

norilia