

Tierra's Deterra jacket

A case study

31 May 2019



Innovation:	100% bio-based jacket
Intervention:	Tierra's Deterra jacket
Case Study by:	Ludwig Bengtsson Sonesson, Department of Political Science at Lund University
Methodology:	8 semi-structured interviews, 2 field visits (to research & development plant, to outdoor stores in Manchester)
<i>Case Study Overview</i>	
Sector(s):	Plastics
Value Chain Stage(s):	Production/Consumption
Type of Intervention:	Technical
Date & Duration:	Development began around the time of COP21, in 2015
Location:	Sweden
Initiating Actors:	Tierra FOV
Actor Constellation:	Tierra – Consumer-facing manufacturer FOV – Fabric developer Fulgar – Yarn producer
Short Description of Intervention:	After COP21 in Paris, the employees at Tierra had a stated goal of addressing their dependence on fossil fabrics. Ideas of both a 100% recycled product and a 100% bio-based product were raised. Ultimately, the company developed a jacket made out of bio-nylon (castor oil as feedstock) – the novelty of which was its utter lack of fossil-based components, threads, buttons, were either designed away or replaced with bio-based/natural components.
<i>Research Theme Summaries</i>	
1. Innovation History & Dynamics:	<p>There is contention around the ownership of the initial idea of a bio-based jacket. Swedish competitor RÖJK released a similar product using bio-nylon a year before Tierra (but containing virgin plastic materials as well).</p> <p>Choosing the bio-based pathway came down to expertise within the team, one employee had previously worked on a peanut-based fabric.</p> <p>The broader use of bio-based fabrics face several major barriers to adoption:</p> <p>A) Justifying the higher price is often hard as companies in the sector run on tight margins. Recycled polyester has become competitive in price, bio-based run up to 3-4 times the price.</p> <p>B) The availability of fabrics is largely dependant on demand from large buyers, in addition, suppliers demand orders of high volumes. Thus, innovation in small firms is hindered since they can't experiment with new fabrics until the dominant actors on the market have caught up. The Swedish outdoor industry has attempted to pool their demands to push suppliers towards recycled, bio-based and biodegradable plastics.</p> <p>C) Clothes can be made from a large number of materials, and each come with their own sustainability issues. Manufacturers struggle to navigate and weight which ones should be prioritised. Bio-based fabrics suffer from the food vs. feed quandary, cotton is water-intense, all synthetic fibres cause micro-plastic pollution and wool faces issues of animal welfare etc. Uncertainty leads to caution and several interviewees indicated that they are waiting for more research before they commit heavily to one solution.</p> <p>D) The outdoor industry relies on <i>quality</i> as one of their main selling points. And there is a worry (justified in some cases) that recycled and/or bio-based carry with them a lower quality than virgin fibres.</p>
2. Governance Arrangements & Agents of Change:	<p>The clothing industry has significant inter-firm governance, but rather lax governance on a state level. Some interviewees requested stronger legislation to level the playing field and boost investments in renewable fabrics. Relevant governance arrangements follow:</p> <p>A) The Sustainable Apparel Coalition and its tool <i>The Higg Index</i> provides a standardised measurement tool for supply chain sustainability. It gathers actors ranging from H&M to Tierra.</p> <p>B) State-level initiatives in Sweden such as the MISTRA Fashion Futures research program, the Swedish EPA's dialogue on Sustainable Fashion and the Cooperative</p>

	<p>Platform for Sustainable Textiles provide platforms for interaction and research towards a sustainable clothing industry.</p> <p>C) Textile Exchange, an American non-profit, disseminates best practices relating to fabrics – which results in <i>Material Snapshots</i> which give manufacturers an overview of the benefits and drawbacks of fibres. Tierra participates in a TE working group on bio-synthetics with the aim of further developing materials such as the EVO.</p> <p>D) Legislation has focused on chemical contents of DWRs (Fluorocarbons) and there is a sense of impending legislation on micro-plastics among interviewees.</p> <p>The Deterra jacket prompted textile firm FOV to replace their entire range of polyester with recycled alternatives and Tierra gained new contacts and knowledge of bio-based clothing details (zippers, buttons etc.)</p>
3. Transformative Capacities:	<p>Textile value chains are infamously long and complex. As FOV were developing the fabric, they had to reach out to manufacturers to iron out issues of country of origin, toxicity and land use change. This resulted in an informational pamphlet detailing the sustainability of the EVO-fabric. However, there is no consensus on where the castor oil actually originates (Brazil, India and China were suggested by interviewees).</p> <p>Tierra (and also their competitor RÖJK) differentiates itself from other clothing manufacturers by focusing on <i>fossil</i> and <i>oil</i>. They claim the raison d'être is to reduce oil dependency and oil usage. The term Fossil Free Jacket was often used to describe the Deterra product.</p>
4. Assessment & Evaluation:	<p>The LCA of the EVO-fabric (conducted by the company who makes it) showed that the carbon emissions associated with the recycled version of the same material (Nylon) were considerably lower (1,77 CO₂-eq vs. 7,36 CO₂-eq) while still beating virgin nylon (9,97 CO₂-eq)</p> <p>The HIGG index is the most widely used assessment tool within the textile industry, its material index contains more than 80 materials, which are evaluated based on impacts to climate change, eutrophication, water, abiotic resource depletion and toxicity.</p> <p>However, there seems to be a considerable lag between how often the library of materials is updated and how often innovative textiles enter the market. For instance, the only bio-based material found by the researchers was PLA (Polylactic Acid). Further institutionalisation of the Index as a guiding heuristic for firms could both foster the transition to sustainable fabrics or hinder it – depending on the materials featured.</p> <p>As was apparent in other industries, LCA as a method of evaluation is useful but flawed. The uncertainty resulting from the vast amount of assumptions, which have to be made in the evaluation, make this type of detailed comparison difficult. For instance, the idea of a complete phase-out of virgin fossil fabrics does not get recognised in LCAs – if virgin materials have a lower emissions footprint they would show more favourable in the comparison.</p> <p>Outdoor company Houdini has recently adopted a new assessment framework based on the planetary boundaries, which shows potential but is still in early development.</p>
5. Uptake & Consequences:	<p>The issue of whether Deterra is always fossil-free came up in our interviews. Without the novelty of being the first to make a fossil free jacket, the high material cost and low production volume becomes increasingly hard to justify.</p>
<i>Conclusion & Outlook</i>	
Key Learnings:	<p><i>Unique features of this case:</i></p> <ul style="list-style-type: none"> • Framing as 'fossil-free' is unique in the sector • Majority of actors in textiles are betting on recycling, bio-based materials are quite rare <p><i>Key insights from this case regarding ...</i></p> <p><i>Overall decarbonisation:</i></p> <p>The Tierra case shows that fossil-free fabrics are a possibility within today's textile sector, if you can make a sturdy outdoor jacket – you could make most garments. Much of the sector is hoping for <i>full circularity</i> and dreaming of a closed loop where virgin materials are no more. There is no certainty that that goal is achievable, so as an alternative to fossil fabrics the innovation is key if we still want new clothes on the market. However, for immediate decarbonisation purposes it has issues of scalability and price, which makes a widespread adoption unlikely.</p>

	<p><i>Drivers and barriers:</i> Drivers: Paris Agreement and intra-firm interest in decarbonisation. Barriers: Cost, supply, material aspects (quality, certain functions), uncertainty of sustainability.</p> <p><i>Challenges and instruments to overcome them:</i> The design of individual garments was identified as a method of overcoming price obstacles (for instance, removing a pocket). Progressive ownership (read not publically traded) seemed to allow more daring innovations and less need for immediate profit.</p> <p><i>Role of policy:</i> The fashion sector is characterised by soft governance without any prominent binding legal requirements (except for some relating to recyclability and chemical use). Many interviewees requested <i>more</i> legislation, which would level the playing field and make more sustainable alternatives competitive on the market.</p> <p><i>Lessons for future innovations:</i> Novelty is a powerful tool in the initial launch of an innovation, “The first fossil free jacket” was a powerful vision. Pooling resources within a sector (to show demand towards suppliers) is a way to speed up development processes along the value chain.</p>
Open Questions & Further Research Requirements:	What is the total volume of textiles we are able to allocate biomass to? Why have fossil fuels been politicised while their by-products (for example plastic clothing) have not?

For Europe to achieve its long-term climate objectives, carbon-intensive industries have to reduce their emissions.

REINVENT focuses on plastics, steel, paper and meat & dairy – industrial sectors that are key to our daily lives, but where low-carbon transitions are still relatively unexplored.

To gain a broader understanding of the possibilities of transition, entire value chains of the industries are studied. This includes non-technical factors such as supply chains, financing, trade, and social and economic impacts. Together with forward-looking industry leaders and policy-makers, we explore potentials and capabilities for making transitions in these resource-intensive industries.

PARTICIPANTS & FUNDING

REINVENT is supported by the European Union's Horizon 2020 Research and Innovation Programme (2016-2020). It involves five world renowned research institutions from four countries: Lund University (Sweden), Durham University (United Kingdom), Wuppertal Institute (Germany), PBL Netherlands Environmental Assessment Agency (the Netherlands) and Utrecht University (the Netherlands).

CONTACT

Lars J Nilsson
Project Coordinator and Professor
Division of Environmental and Energy Systems Studies
LTH, Lund University.
PHONE: +46-46-2224683,
E-MAIL: lars_j.nilsson@miljo.lth.se

MORE INFORMATION

WEBSITE: reinvent-project.eu
TWITTER: [@reinvent_eu](https://twitter.com/reinvent_eu)