Discover the winners of the 2019 Innovation Challenge

The 2019 Innovation Challenge Jury

NEW
The Eco design platform

Success Stories of the Year

Cover photo: © PLAXIL - MAUJU - The sheets photographed are from industrial textile recycling.
INNOVATING IS RECYCLING

Voted in February 2020, the French law on Waste Management and Circular Economy clearly indicates the areas of change for our clothing/footwear industry to become exemplary and responsible. These new measures affect all parties involved in a product’s lifecycle (marketers, collection, sorting and recovery operators, local authorities) and provide Eco TLC with an opportunity to boost its role in assisting these parties to move towards a 100% circular industry.

With an authority approval renewed for a further 3 years (2020-2022) speeding up industrial recycling is one of our major transformation projects, with two key tools: the Innovation Challenge and downstream working groups on composites and non-wovens for the transport industry.

For its 10th edition, the Innovation Challenge, Eco TLC’s call for R&D proposals, has been recasted: strategic areas have been redefined (see pg. 3) as well as the Scientific Committee’s Missions (see pg. 4) and the recruitment of new members (see pg. 5).

2019 was a particularly good vintage, with 9 winners and €730K of funding to finance innovative industrial and business solutions that optimise clothing and footwear recycling. This magazine presents each of these in detail in pages 6-23.

In 10 years, Eco TLC has funded 52 projects for a total amount of €4.7M (see overview of projects on pg. 28).

Another major area of transformation to be unveiled on 1 September 2020 is the “Eco design platform”. Aimed at brands’ product teams, this awareness raising tool to clothing and footwear eco design shares a common language and makes it possible to co-build an eco-design approach with as many stakeholders as possible (see pg. 24).

Since March 2020, the halt in production, consumption, collection, sorting and recycling of CLF (clothing, linen and footwear) has put our entire ecosystem in jeopardy. Major upheaval should be expected. What’s the future of the clothing/footwear industry? How do we recover from this unparalleled crisis? At the time of writing this editorial it is impossible to predict what the industry will be like tomorrow. This is why we are convinced that we have to speed up stakeholder commitment on circular business models: generalise sustainable eco-design initiatives; produce closer to distribution locations; consume better with less; sort more and sort wisely; and above all industrialise used CLF recycling in France and in Europe in synergy with other sectors.

It is up to us, together, to reinvent our industry.

Maud Hardy
Circular Economy Director

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--- FEEDBACK ON THE 2019 INNOVATION CHALLENGE ---

Innovation Challenge

REAL IDEAS TO REVOLUTIONISE CLOTHING AND FOOTWEAR RECYCLING

Over the last 10 years, the call for R&D proposals organised by Eco TLC has funded 52 projects in order to optimise clothing and footwear recycling. The 9 winners of the 2019 edition are also going to participate in speeding up the development of a circular industry.

By creating its R&D call for proposals in 2010, Eco TLC had two main aims. The first was to find innovative industrial and business solutions to optimise clothing and footwear recycling. The second, to speed up the development of a more circular industry in synergy with other sectors (construction industry, automobile industry, etc.).

Ten years later, the aims have not changed and the challenge is still to recycle every year 100,000 tonnes of non-reusable worn clothing and footwear, i.e. for 2019 40% of the 250,000 tonnes that are collected and sorted. To achieve this, in compliance with its authority approved specifications, every year Eco TLC organises a call for R&D proposals, i.e. the Innovation Challenge. For this 2019 edition, 9 projects were selected by a Jury from Eco TLC’s Scientific Committee, thereby joining the other 43 projects funded since 2010. All of these result from the creativity and know-how of the industry’s different stakeholders, committed in optimising clothing and footwear recycling in speeding up circular development.

In 2019, the projects submitted to the Innovation Challenge Jury were required to meet at least one of the three strategic areas defined by Eco TLC:

- A project could involve the preparation of materials derived from used clothing and footwear. It thereby covered sorting techniques, characterisation methods, separation and preparation of materials or the logistical organisation of product take-back and the bulking of material feedstock.
- It could also deal with the incorporation of recycled materials from the CLF industry into products for other industries (construction, automobile, etc.).
- Finally, the last strategic area, the eco-design of CLF industry products. Projects addressed problems in material disassembly and separation, reduction/removal of elements that disrupt recycling, incorporation of recycled materials from textile/footwear waste, the extension of products’ lifespan or the creation of new circular materials.

Moreover, in order to be eligible for the Innovation Challenge, a project has to provide genuine industrial perspectives and have a real impact for the industry. The aim here is not to fund fundamental research but to assist the tangible implementation of innovation through a mid-term industrial and business development plan.

Similarly, the project has to deliver an environmental benefit compared to other existing products and processes.

Open to all, €500K per year is allocated to the Innovation Challenge, not including participation, nor licence fees. Eligible costs that can be borne by Eco TLC include the following: personnel, research equipment, material procurement, consumables and supplies related to the project, etc. Corresponding to a net subsidy, Eco TLC’s funding cannot exceed 50% of the project’s total cost. So, before applying for the 2020 edition, discover our special section on the 9 2019 Innovation Challenge winners.

Materials from clothing recycling.
Eco TLC holds a vision of the future: one of a 100% circular clothing and footwear industry. This meets an urgent need in environmental protection and a technological challenge on which Eco TLC’s Scientific Committee, an expert and assessment body, provides a key insight.

Since 2010, its thirty or so members are selected for their experience in the CLF industry or their authority in used CLF recovery and environmental protection and a technological challenge on which Eco TLC’s Scientific Committee, an expert and assessment body, provides a key insight.

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The 2019 Innovation Challenge Jury

Members of the Eco TLC Scientific Committee, the 2019 Innovation Challenge Jury has nominated the 9 winners. Who are the experts who make up the Jury?

Florence Bost – SABLE CHAUD

Jean-Claude Jégou – Fédération de la Chaussure

Kim Picard-Chaïbi – TECHTERA

Engineer from the INSA Engineering School in Lyon, Kim is responsible for recycling and circular economy projects at Techtera, launching, coordinating collaborative innovation projects and facilitating the textile sector.

Jean-Claude Jégou – Fédération de la Chaussure

Former footwear manufacturer CEO, who is today responsible for innovation and development within the Fédération de la Chaussure, UCOS vice-president and coordinator of the ResoCUR New Aquitaine cluster.

Ludovic Koehl – ENSAÏT / GEMTEX

Engineer/researcher and Doctor in Philosophy, Scientific Adviser at GEMTEX, Ludovic is involved in a large number of projects on optimising textile quality and comfort by integrating physical measures and human knowledge.

Maxime Lerbut – PROMOD

An ESTIT textile engineer, Maxime was Procurement Manager for Klaid and then Pirimiko and is currently Sustainable Development and Supply Manager for Promod.

Régis Léty – CTC

Sustainable Development Manager at the Centre Technique du Cuir since 2002, Régis works on footwear and leatherwork lifecycle analysis, the carbon footprint of companies and on several research projects on recycling waste produced in the industry.

Jeanne Meillier – EURAMATERIALS

Project Manager at Euramaterials (merge of UP-lex and Maille Kawasaki competition clusters), Jeanne supports European circular economy projects in the textile industry.

Christine Broweays – T3NEL

Textile Engineer (Grenoble, INP, Ensimag). Since 2009, Christine has been working on innovative textile production and has several reference publications including “The Challenges New Textiles Face” in 2014.

Frank Duhamel – PLASTIUM

ENSAT Textile Engineer. Industrial Expert in textile manufacturing and very active in innovation: former Chairman of Amari’s Steering Committee, former CEO of a textile incubator, an IFTH Board Member. Frank is currently Development Officer at Plastium, a plastics and composites excellence cluster.

Claire Pottion – SYNERGIES TLC

Recyclers

Development Advisor

Maxime Lerbut – PROMOD

Claire Loire – LACOSTE

Marketors

Karine Star – Fédération de la Maille, de la Lingerie & du Bainéaire

Karine is an engineer graduate from the Industrial Chemistry National School in Lyon, was Environment Technology Manager for 14 years and then Delegate General for the last 9 years at the Fédération de la Maille, de la Lingerie & du Bainéaire.

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Florence Bost – SABLE CHAUD

Jean-Claude Jégou – Fédération de la Chaussure

Ex-head of the GEMTEX laboratory, Romain assists in charge of monitoring CLF EPR.

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TEXTILES WILL TURN INTO PLASTIC...

The additives created by Hervé Guerry for Cycl-add will transform polyamide textiles into a new plastic for the industry.

Your goal is not to recycle used textiles into textiles but to create a new plastic material for the industry. Why? Recycling textile into textile is very complicated because there is practically no textile industry left in France. However, France has a very strong plastics industry and therefore our project consists in recycling used, non-reusable clothing into plastic parts. Our technology already enables us to recycle complex plastics and we will apply the same concept to clothing.

You do indeed state that 90% of our clothes are plastic! Polyester is the same synthetic material as that of mineral water bottles. Polyamide is also a plastic. Even a cotton T-shirt is rarely 100% cotton; it often contains polyester. Therefore, for us clothing is a gigantic source of materials. Clothing is often complex and multi-fabric, in several layers. For example, a ski jacket is comprised of, amongst other things, polyester and polyamides. We know how to recycle polyester but not polyamide mixes. So, landfilling polyamides has a cost for a recycling centre, a cost which is included in the price of polyester recycling. And there’s a lot of polyamide out there: tights, T-shirts, sportswear often with elastane too. The question therefore is: how can these materials be separated to create others but at a viable cost? This is the balance that we must check within the framework of the Textic project.

This plastic will have new qualities. How? The problem is indeed to give new properties to this material according to the target market: resistance to collisions in sports-leisure wear and the automobile industry, how it handles moisture, responds to weather conditions, etc.

Our Textic project consists in recycling used clothing into plastic. To provide a solution we have invented an unprecedented technology. We use industrial waste to create additives. These are mainly powder paints, but also toner from printing ink cartridges, waste that up to now was simply landfilled. Cycl-add collects this waste from industrials and invented a process that enabled two boosters to be created (Anti paros and Tinos) and an environment-friendly dye (Persissa). These additives provide the material with resistance properties that are required, for example, against fire. Ultimately, from polyamide clothing we will obtain a polyamide material for technical uses such as car motor parts, ski fittings, parts for swimming pools, etc.

At which phase of the project are you at? With lockdown we have suffered delays but the first trials carried out in our Oyonnax plant, in the “Plastic Valley” (Ain county, France) are very satisfactory. Firstly we have to define how we will prepare the polyamide clothing (shredding and sorting) then how we process them with our additives in order to obtain a new material. Also, the laboratory tests are very encouraging. We will then have to test this material with technical applications, study the characteristics obtained and lastly modify them according to specs. The project will last for a total of 13 months.

THE JURY’S OPINION

“This project is a true innovation because it should enable traditional additives to be bypassed. Sound and well built (trials, partnerships), it provides a genuine industrial process.”

Joël Barrault
Scientific Advisor - Valagro Recherche

THE 2019 INNOVATION CHALLENGE WINNERS

OBJECTIVE: Developing a recycling chain for polyamide-containing clothing in order to manufacture plastic parts.

PROJECT SUMMARY

PROJECT STRATEGIC AREAS:

- Preparation materials for recycling.
- Incorporation of materials coming from CLF recycling into other sectors.

Type of CLF covered:
CLOTHING

Eco TLC funding: €60,000

Project duration:
13 MONTH
BE DARING WITH A BRICK... MADE FROM RECYCLED FABRIC!

Created by Clarisse Merlet, founder of FabBRICK, this new construction material for partition walls and seating will provide an innovative solution for recycling clothing.

How did you get the idea of making bricks from recycled clothing?
When I was studying my 3rd year of architecture in Rouen, I visited a travelling exhibition called “Matière Grise” (grey matter) at the Pavillon de l’Arsenal that exhibited small architectural designs made from waste. Knowing that the French people throw away a large quantity of clothes every year, I thought about making bricks using collected, sorted and shredded clothes. These bricks are thereby comprised of several fabrics (cotton, polyester, viscose, elastane, etc.). The aim isn’t to build houses in cotton bricks, but to replace plasterboard sheets with acoustically and thermally insulating FabBRICK internal partition walls, and to create furniture and seating. My project may represent an alternative for brands that must give a second life to their unsold items under the French law of 10 February 2020 on Waste Management and Circular Economy.

What are the project phases and ultimate goal?
Today, 17,000 bricks have been made and more than 8 tonnes of collected items of clothing have been recovered in our workshop. Production is currently handmade using compressors designed with my father, an industrial designer. I’m currently working on the industrialisation of this process with the project of a small pilot factory in Paris. Furthermore, R&D on the material is ongoing in order for it to be a construction material, accessible to all specialised shops. My material remains too light to be used for a supporting partition wall. For the moment, I make my bricks for decorative and insulation purposes, that can be affixed to existing partition walls. By profession, I’m an architectural designer and interior designer. The challenge is to work with qualified persons to develop a self-supporting material.

Is the secret of your recycling solution a glue that you invented?
Yes, it is. It took me 6 months, all by myself, to create a glue that perfectly binds the textiles, that is not chemically-based nor polluting. It is made from ingredients that do no deteriorate over time. The aim is not to build houses in cotton bricks, but to replace plasterboard sheets with acoustically and thermally insulating internal partition walls, and to create furniture and seating.

THE JURY’S OPINION

“What interests me about this project is the goal to create new construction material from these recycled textile bricks and thereby provide a solution to the world of construction.”

Maxime Vermeulen
“Future Industry” Projects Manager - Plasti polis

OBJECTIVE: Developing a structural, insulating and aesthetic construction material made from recycled textiles.

PROJECT STRATEGIC AREAS:

- Incorporation of materials coming from CLF recycling into other sectors.

Type of CLF covered: CLOTHING AND LINEN

Eco TLC funding: €90,532
FOR QUALITATIVE AND COMPETITIVE RECYCLING OF POLYAMIDE

Filatures du Parc’s aim is to create the first 100% recycled polyamide yarn made from end-of-life clothing.

Why isn’t polyamide from used textile currently recycled into yarn?
No-one has yet addressed this problem. Indeed, this is an elastic and resistant fibre making it difficult to recycle. Thanks to our patented defibering machine and our experience we have decided to rise to the challenge with the Pamrec project! Polyamides, invented in 1927 by Dupont de Nemours, have become popular synthetic yarns found in the composition of many clothing items (tights, T-shirts, sportswear, etc.). Unfortunately a significant amount is currently lost. The environmental balance is poor and, for the moment, polyamides are not part of a 100% circular economy.

What solution does the Pamrec (recycled polyamide) project provide?
Filatures du Parc have developed a defibering technique allowing to recover fibres from used clothing, with properties close to those of virgin fibres, especially fibre length. We have also managed to create recycled wool and recycled cotton yarns for knitting and weaving. Our know-how in defibering and the means of adjustment of our machines lead us to believe that we should be able to maintain a high enough quality for recycled polyamides in the footwear articles (stockings-tights, socks).

What are the project’s phases?
Based on the selective sorting of end-of-life clothing, an industrial feasibility study needs to be undertaken. The first stage is to study the sector’s structure (collection, sorting, disassembly) and the corresponding economic impacts. At the same time, a study on the industrial spinning line will also be undertaken by finding adjustments and the material transformations required for manufacturing this new yarn. We’ll check the technical feasibility, ensure that the material’s quality is maintained for reuse in the industrial sector, and will address the economic viability of this recycling chain. Lastly knitwear industrials, and maybe weaving, will be invited to make sample items that will be tested (abrasion, sizing stability, etc.).

What are the sales outlets?
The socks and tights brand, Bleufôret (Tricotage des Vosges) will make prototypes and will characterise them according to their technical specifications. Helève Verhelle from Povera will make fabrics with recycled yarns made by Filatures du Parc. Our main goals are to offer a collection of yarns made from 100% recycled polyamide and to be able to offer our clients 100% recycled yarn from their own pre- or post-consumer waste.

THE JURY’S OPINION

“This is an interesting project because it is being led by a major player in the recycled material sector in France that is part of an entire ecosystem. In particular, it will ultimately provide the opportunity to have a closed loop, polyamide recycling value chain, i.e. manufacturing yarn made from used clothing.”

Kim Picard-Chaïbi
Project manager - Techtera.

THE 2019 INNOVATION CHALLENGE WINNERS

Eco TLC’s funding: €172,240

OBJECTIVE: Recycling used clothes made from polyamide to make a 100% polyamide yarn for the footwear articles sector and to create new fabrics.

PROJECT STRATEGIC AREAS:
- Preparation of materials for recycling.
- Eco-design of products in the CLF industry.
- Type of CLF covered: CLOTHING
THE 7 LIVES OF PVC

Despite the company already recycling its own production waste, Anne-Céline is widening her process by collecting sandals and boots to recycle up to 7 times the PVC they contain!

Why is PVC’s ecological image so negative? Firstly, for a long time PVC contained phthalate, a chemical considered to be potentially harmful to health. Humeau-Beaupreau, the last French PVC boot injector hasn’t used this for the last 20 years. This corresponds to our undertaking in product safety and we request the same from our suppliers. We test our products every 6 months to check them. PVC recycling processes do not exist in France. PVC footwear at the end of its service life is simply incinerated. However in reality the negative image of single-use plastic disposal doesn’t apply to PVC. Our sandals and boots last for 15 years and are 100% recyclable 7 times without the PVC losing any of its properties. We already do this internally.

How do you do this? Since 2014, we have recycled up to 99% of PVC scraps and waste coming from our footwear articles. We can do this thanks to the acquisition of a bi-material shredder unit enabling PVC to be separated from textiles because in a boot, PVC is integrated to a fine textile sock that lines the boot. Upstream we have implemented colour sorting in order to obtain 4 colours by adding dyes to shredded PVC: black, green, brown and midnight blue. For 1 tonne of PVC boots production waste we are able to recover 900 kg of PVC with the same quality, for reuse into the production chain.

So the ReBoot project extends this production waste recycling process to the recycling of post-consumer footwear? Yes exactly. We want to recover our end-of-life products and give them a second life. We sell 1 million pairs per year and the idea is to collect our products first, then step by step, extend collection to all used PVC footwear. One of the difficulties is to avoid collecting products that contain phthalates in order to maintain the PVC’s integrity in our footwear. Indeed, phthalate has only been prohibited for the last 5 years and can therefore still be found in some of our competitors’ end-of-life products.

Are you going to start by a feedstock study? Indeed, we are going to examine what we can recover and under which conditions. We have to get organised with a collector, find out the exact composition of products which aren’t ours, and think about how to give a second life to products, textile waste and PVC that we won’t retain. It is also important to design the cleaning stage. A pair of work boots used in farming may contain traces of fertiliser. We must work on a cleaning and drying unit, even including disinfection, so that the boots are completely clean before they are recycled. In parallel we’re also studying the cost of this recycling process.

Will collection operations be launched in January 2021? Due to lockdown, the project has been slightly delayed but we have already started to contact retailers in the Pays de Loire region. At the beginning of next year, we will carry out a collection test in order to confirm the semi-industrial process while checking its financial and operational feasibility. There are no major technical obstacles and the creation of a recycling loop for end-of-life PVC footwear items will be a true innovation for the industry.

THE JURY’S OPINION

“...This project is a first that is of interest to the entire industry because no-one currently recycles PVC. Products are sent to waste treatment centers to be incinerated and this cannot continue. Recycling PVC is a true challenge.”

Jean-Claude Jégou
Innovation and Development Manager - Fédération de la Chaussure.

OBJECTIVE: To perform a pre-study on the feasibility and the costs of recycling end of service life PVC footwear.

PROJECT SUMMARY

PROJECT STRATEGIC AREAS:
- Preparation of materials for recycling.

Eco TLC funding: € 80,000

Project duration
19 MONTHS

FOOTWEAR

Type of CLF covered
Eric Durivault  
Idelam Co-CEO  
eric.durivault@idealtechnologies.fr

**A TRUE IMITATION LEATHER**

Hosted by the Chemistry and Condensed Matter Institute in Bordeaux (ICMCB), IDELAM, managed by Eric Durivault, offers imitation leather from footwear recycling.

**What is at stake in the ReCHAUSS project?**
The aim is to build a profitable footwear recycling process in France. What’s the current situation? Operators process around 15,000 tonnes of footwear to be sorted every year. 85% of the pairs collected can be reused and are mainly sold for export. Amongst the remaining 15%, “single shoes” in good condition are exported to Pakistan to be sorted and re-paired, the rest is recovered as SRF or incinerated. As waste cannot normally be shipped across country borders, the export outlets will gradually close. We’re then going to find ourselves with a stock of footwear that cannot be reused and that we don’t know how to sort and recycle!

**Why don’t we know how to recycle footwear?**
The separation of multi-material and multi-layers waste is one of the main challenges for recycling numerous types of waste, including those from the CLF sector. The “ReCHAUSS” project is part of the continuous development of a technology able to delaminate the waste comprised of several materials closely bound together, especially by glue. Delamination is a process by which these different components or layers are separated. Once separated (and not shredded) these fractions constitute streams of uniform materials acceptable for material recycling processes, in particular for textiles and leather. We are particularly interested in leather.

**What technology are you offering?**
The IDELAM technology is from a patent filed by the CNRS on supercritical fluids and for which we have an exclusive worldwide licence. We have created a laboratory prototype, tested and validated the process by carrying out 90 experiments on 50 different products. Basically, it is a reactor into which footwear is placed at a given temperature/pressure. At a precise moment, CO₂ gas is injected. The reactor then moves into a phase called “supercritical”, i.e. the glue has totally disappeared. The elements separated from footwear having undergone delamination are then sucked up, the reactor is opened and all pieces are found disassembled as the glue has totally disappeared. The elements are then separated using a ballistic sorting tool. Supercritical fluid is very well known in the industry, especially in the agri-foods sector. The innovation here lies in having discovered the right balance between temperature/pressure/given time/CO₂ ratio.

**And how do you move from small pieces of leather to a new material that can be used to make new products?**
To do that, we link up with an American patent to defiber leather and recreate a new uniform material. We then obtain a soft and smooth imitation leather having the same texture, feel and colour as leather but smoother and moreover recyclable. Americans already use this material to make motorbike seats and automobile equipment. In the November 2019 American magazine Forbes, Jim Pisani, CEO of Timberland, said: “we are extremely enthusiastic by the perspective of recycled leather as we’re working towards a more sustainable supply chain. We’re excited to present our first recycled leather footwear collection in autumn 2020”. Under consumer pressure, all brands will come to use this.

**What other uses are possible for this multi-layer products delamination process?**
We have already identified a dozen: footwear, of course, complex plastic film packaging such as milk cartons, photovoltaic panels, chip cards, coffee capsules, certain cosmetic packaging, etc.

**What are the next stages in the “ReCHAUSS” project?**
The entire industry is in the process of structuring itself in the Nouvelle Aquitaine region and includes, in the first instance, the collection of used footwear. Some innovative leads are tested such as a footwear take-back scheme which Decathlon, Intersport and Eram are examining. Then, smart sorting needs to be implemented. One of the leads is to insert a QR code on the label right at the start of manufacturing that indicates the composition of the footwear and this code would be read during sorting. This QR code project is a European one, but the Nouvelle Aquitaine Region already funds a programme aiming at bringing back sorting lines to France. To be ready for these lines, IDELAM has undertaken to supply an industrial delamination prototype for collected footwear in 2021. 10kg of delaminated materials will be sent to the United-States for defibering and validation of this step. In the future, we’ll produce this imitation leather ourselves.

**THE JURY’S OPINION**

“I have been convinced by this project’s innovative character and consider that supercritical CO₂ delamination is an interesting area to explore for recycling CLF.”

Clara Pottón,  
Textile Recycling Projects Manager  
-Synergies TLC

**PROJECT SUMMARY**

**OBJECTIVE:** Creation of an industrial delamination prototype for multi-material, multi-layer footwear.

**PROJECT STRATEGIC AREAS:**

- Preparation of materials for recycling

**FOOTWEAR**

**Eco TLC funding:** €55,450

**Type of CLF covered:**

- Multi-layer

**Elements separated from footwear having undergone supercritical fluid delamination.”

**Diagram of the IDELAM process.”

**Project duration:**

24 MONTHS
By designing a new recycled cotton yarn, the famous briefs brand intends to offer The Circular Briefs in its shops by January 2022.

Why doesn't underwear made from recycled materials exist? Each year, 2.8 million items of clothing are put on the French marketplace and less than 1% is recycled to make new clothes. In regards to underwear and socks this is zero. For maximum comfort, most of the underwear and socks manufactured over the last twenty years are comprised of two mixed materials: cotton and elastane. However, as we don't know yet how to separate these materials, recycling mixed materials remains more complicated than recycling mono-material clothing. The purpose of the Slip Circulaire project is to develop new recycling techniques in order to obtain a quality cotton yarn that is thin enough and of good quality to remanufacture underwear. We would thereby be able to offer truly eco-responsible fashion.

How was the Moncoton project created, that you have now joined? It was initiated 3 years ago by the 1083 team, a French jeans manufacturer. Funded by Eco TLC and the ADME, 1083 managed to develop a recycled cotton yarn from used jeans. So, we have the same approach with a technical difference: cotton yarn used for underwear is much thinner than that required for weaving jeans. The aim of the Slip Circulaire project is to create a finer yarn from clothes other than jeans. In regards to the research, we have a partnership with the Lorraine Cetelor Laboratory that works with machines provided by MK2T. Together, we’re going to study how used clothes respond to different garnetting processes and see if we can manage to obtain a sufficiently qualitative recycled cotton yarn.

THE JURY’S OPINION

“The interest here is that the project is both upstream, with the feasibility of a recycled yarn as fine as possible and with the highest possible recycled cotton content, and also downstream with industrialisation issues (adjustment of machinery) and the final product design.”

Marc Haquette
ex-CD2e

The Moncoton project aims at developing new recycling techniques in order to obtain a sufficiently thin and qualitative yarn to remanufacture underwear.

In which phase is the project today? We should have started the collection phase on 11 March but with lockdown, this has been delayed by two months. We work with the sorting operator Le Relais Val de Seine who will supply us with our first 20kg batch of “all sorts”, underwear and socks which composition is mixed and unknown. We collect our own brand end-of-life products from consumers (second 20 kg batch) in-store because we have the responsibility of knowing how to recycle clothes that we sell and because we know the exact textile composition of our products. We will therefore have a baseline that will enable us to understand the effects of composition on garnetting, Le Relais deals with trimming, i.e. removing the elastic and the label in order to obtain a uniform material ready to be recycled.

What are the properties of the future recycled yarn? At Cetelor, we are going to carry out tests on 3 yarn thicknesses having different amounts of recycled cotton. One will be 1/60Nm, a very fine yarn that we use for our underwear with a minimum of 35% recycled cotton but with a goal of 60%. For the 1/50Nm, our minimum objective is 40% of recycled cotton but hoping to achieve 65%. Lastly, for the 1/40Nm yarn, we’re aiming for a minimum of 50% recycled cotton but with a goal of 75%. Throughout this research we will analyse the behaviour of elastane to find out if it disrupts (or helps!) the yarn-making process. At the end of 2020, we will move onto the semi-industrial phase with a new collection, this time with 100kg. The goal will be to produce an entire bobbin of recycled yarn that we will characterise (fineness, thickness, composition, etc.) and that we will send to our manufacturer, Lemahieu, for the Slip Circulaire weaving-making phase, the very first eco-designed and recyclable item of underwear. If everything goes according to plan, it should be in-store by in January 2022.

From material knitting to packaging including the elastic and labels, all supply and manufacturing stages are carried out in France.

Project: LE SLIP CIRCULAIRE

THE SLIP FRANÇAIS WANTS BRIEFS ...TO BE CIRCULAR!

OBJECTIVE: Development of a suitable yarn for knitting underwear with the highest possible recycled cotton content.
Jennifer Weimerskirch
Innovation and Eco-responsibility Manager
projet@billion-mayor.com

AT LAST AN ECO-FRIENDLY ELASTIC YARN

At Sofila, Jennifer Weimerskirch works on an elastic yarn that is innovative, environmentally-friendly and made in France.

In what way do the elastic yarns that we know pollute?

An elastic yarn is made of elastane that has elastic properties, covered by another fibre, cotton or polyester, in order to make it more resistant. Elastane (an oil derived) pollutes because its manufacturing process requires toxic solvents and at the end of its life cannot be recycled. We cannot separate elastane from cotton or polyester and we end up with waste that is impossible to recycle and that is either incinerated or landfilled.

1 million tonnes of elastane were produced in 2019, 75% of which in China.(1) Relocating back to France the production of a yarn with the same properties as that of elastane is also another stake.

What is this new process?

Sofila is a milling - texturing company, a yarn specialist having a laboratory and two factories. Along with our partners, the French Institute of Textile and Clothing and Innothera, a company in the health sector, we're going to manufacture a bi-component yarn, based on polyamides and thermoplastic elastomer. The process known as "high-speed melt spinning" already exists for manufacturing polyamide or polyester yarns, but it has not yet been technically studied for making an elastic multi-filament. This is where our innovation lies: include elasticity in an existing process. The manufacturing method that we're developing is quick, doesn't require any solvents and results in an intrinsically elastic yarn that can be recycled.

Does your ReSY (Recyclable Stretch Yarn) project meet the Fashion Pact goals, launched at the G7 meeting in August 2019, aiming to reduce the environmental impacts of the textile industry?

Indeed it does. Elastic yarns are present in a huge amount of sports clothing, socks and limited lifespan medical compression items, etc. We can therefore improve the environmental impacts of these products by replacing elastane with a new, innovative, environmentally friendly process and allowing end-of-life products recycling.

What are the next steps in the project?

In the first instance, choosing materials with a view of getting a high performance and spinnable mix. After testing, we'll proceed with spinning tests in the laboratory to characterise the stretch profiles, mechanical properties, dyeing problems, etc. Lastly, we'll adjust milling and texturing processes in order to obtain unprecedented mechanical and uniform dyeing properties.

The manufacturing method that we’re developing is quick, doesn’t require any solvents and results in an intrinsically elastic yarn that can be recycled.

(1) Source: Man Made Fibers Year Book 2018.
TAILOR-MADE RECYCLING

At Synergies TLC, Clara Potton is undertaking a study on the industrialisation of textiles preparation for recycling in order to meet the technical specifications of each recycler.

In 2015, why did 6 CLF collection and sorting centres join forces to form Synergies TLC? Recyclo,Recolte, Vosges TLC, Alpes TLC, Tri Vallées and Provence TLC, all CLF collection and sorting centres in France and Belgium, joined forces because they share a common goal: to industrialise end of life clothes recycling. Currently, trimming and sorting tasks are carried out by hand. The process is therefore slow, not very precise due to the material mix in textiles, and expensive, thus preventing a viable economic model to recycle these textiles.

What does the UTILE project consist of? The UTILE project (industrial trimming and sorting of clothing and linen) that Synergies TLC leads consists in validating the economic and technological feasibility data for a future industrial unit that will process the 50% of clothing which, after sorting, is not currently reusable on the second hand market, and therefore shipped abroad for recycling.

What are the project’s key points? To work with recyclers in order to understand their needs in terms of raw materials, understand the properties that they look for in regards to fibres, composition, preparation and colours. Once the different technical specifications have been defined, we’ll study the existing equipment in order to identify those that are the most suitable to meet the specifications. The technological tools must enable the materials and colours to be precisely identified. Some machines may need to be modified and we must think of the best way to make these machines work together. The study that runs until July 2021 must validate the future industrial unit’s economic model in relation to the market’s needs. The next stage will be its construction.

In what way is your solution “tailor-made”? The purpose is to meet a recycler’s specifications as best as possible. We will supply them with precisely sorted per material. Or that the material supplied is shredded or cut into 4x4cm squares. Let’s take the example of a jeans recycling company. It has implemented in-store collection with a view of garnetting these used jeans. They can work with us to supply used jeans of a certain colour in order to have uniform batches or get more if collection is too low. We will supply them with jeans after having removed the hard points so that they can process the material. This tailor-made approach means that we can work to order, following the requirements.

Is the field of potential applications significant? It’s enormous. In fine, these recycled textiles will be transformed into yarns for the textile industry, insulation for buildings, into compounds for the plastics industry, etc. Our work is to envisage all possibilities too.

Currently, trimming and sorting tasks are carried out by hand. The process is therefore slow, not very precise due to fabric mix and expensive, which prevents a material recycling economic model to be found.

THE JURY’S OPINION

“This project is interesting because of its industrialisation ambition by replying to current obstacles in the industry, i.e., sorting of materials and the removal of hard points.”

Marc Haquette
c-CD2e

(1) Source : Eco TLC

OBJECTIVE: Testing and demonstrating the feasibility of an industrial unit for trimming and sorting cotton, polyester and polyamide textiles (100% and mixes).

PROJECT STRATEGIC AREAS:

- Preparation of materials for recycling.

Type of CLF covered: CLOTHING AND LINEN

Eco TLC funding: €116,822

PROJECT DURATION: 18 MONTHS
TRIMCLEAN, THE END OF HARD POINTS

By using artificial intelligence, the tool designed by Valvan will enable trimming of used clothing to be industrialised.

Your Trimclean project targets trims. Are these a significant obstacle in the recycling of non-reusable clothing? In the fashion industry all materials other than fabric that are directly attached to an item of clothing are called trims. These include zips, buttons, embroidery, labels, patches, beads, motives, etc. Textile sorting and recycling companies consider this problem as "THE" bottleneck preventing the industrial recycling of textiles. Numerous automated solutions for the different parts of this recycling value chain already exist, but their interconnection is still missing. With Trimclean, an automated trimming technology for used clothing, Valvan would like to find the missing link for eliminating trims.

So is the solution to cut out the parts of the clothes containing these hard points? Yes exactly. The technology cutting clothes into small shreds already exists in France and in Italy. So we're not going to focus on cutting but on a technology that recognises trimmings in order to sort the small shreds. This doesn't exist and this operation is currently carried out manually, using scissors. We have some leads, especially in using artificial intelligence. This is at the heart of the Trimclean innovation. With the help of Eco TLC funding we're going to study, develop and test Trimclean.

How do you intend to proceed? The idea is to cut up clothing into pieces of around 60x60mm before removing the pieces containing trims. These pieces will be spread out so that different inspection and detection techniques can be used to gather information for each individual piece of clothing and its trims. The combination of this information will feed a smart algorithm, capable of detecting pieces containing trims. Then these will be ejected from the conveyor belt by air jets. At the end of the process we will obtain material free from any hard point, ready for the mechanical/chemical recycling of used clothing.

So Trimclean cannot be dissociated from one of your other innovations, Fibersort? That's right. One works after the other in an automated sorting chain. Fibersort is a technology which enables us to automatically sort large volumes of post-consumer clothing based on their fibre composition. The scanning technology utilised is NIR spectroscopy, a spectroscopic technique based on the molecular absorption measured in the electromagnetic spectrum's near infrared part. Fibersort thereby enables the clothing's fibre types to be determined (cotton, wool, polyester, mix of these fibres, etc.) and to sort by fibre type. The Trimclean algorithm will use the information obtained during the Fibersort stage and this will enable us to personalise Trimclean's detection parameters based on fibre type and colour. The Fibersort/Trimclean combination will then enable the industrialisation of recycling at an acceptable cost.

At which stage of the project are you at? We should have started the 1st research and development stage in March 2020 but with the health crisis, it will only start in June or July. This is the stage of the project funded by Eco TLC. So, our goal is then to build an entire industrial chain integrating Fibersort and Trimclean.

THE JURY'S OPINION

"Valvan is addressing one of the major recycling obstacles: hard points. The advantage is that Valvan sits in an entire value chain for preparing materials. Lastly, the idea of using artificial intelligence is interesting. It is a form of robotisation that makes the process economical."

Jeanne Meillier
Project Manager - Euramaterials
ECO DESIGN, THE ECO-DESIGN GUIDELINE

New and unprecedented, this digital platform, created by Eco TLC, provides information and support to clothing and footwear brands in order to rise to the challenges of eco-design.

Everyone is talking about it, but few know how to implement it: the circular economy is growing and with it eco-design, a powerful driver for changing the clothing and footwear industry model. Producing more sustainably, reducing the quantity of waste and working towards recyclability: such is the battle that we face today. To win this battle, Eco TLC has created, in partnership with the ADEME, the DGE and an experts committee that has validated all the project phases, the Eco design digital platform, a concise and accessible tool for raising awareness in eco-design and supporting brands.

The eco-design reflex.

"Eco design is aimed at fashion professionals such as designers, technologists, product or collection managers because it is them who now have the power to design their products in an eco-friendly way", explains Adèle Routhiau, Eco-design Project Manager at Eco TLC. Universally pleasing, the Eco design site covers the visual conventions of fashion sites and can be consulted by everyone: brands, suppliers and partner manufacturers (including internationally via the site’s future English version) as well as fashion students. Aware right from the beginning of their studies, these students are future fashion professionals for whom eco-design must become an automatic reflex. The platform thereby provides all the basic knowledge needed: understanding about materials, dyes, possible alternatives, lifecycle analysis, etc. Eco design is a tailor-made eco-design guideline!

Practical and tangible fact sheets.

"We also want to help brands take action" continues Adèle Routhiau. "On the site there’s the tab “Your turn to act” providing practical fact sheets to assist, step by step, product managers, designers and buyers to switch to eco-design. Each fact sheet includes a dozen stages to be followed one by one. For example, with the fact sheet “Design a more easily recyclable textile product”, professionals can learn about those who are taking action, what type of partnerships they need, what financial savings are expected and how long it takes to implement. It’s extremely practical! The heading “They did it” also provides feedback from those marketers already practicing eco-design (methodology, obstacles encountered and drivers for success). Eco TLC already thinks of new functionalities for the Eco design platform such as a tool allowing fashion professionals to contact collection and sorting operators in order to implement product recycling initiatives. Or also an environmental calculator that will enable fashion brands to evaluate the environmental impact of their products throughout their lifecycle in just a few clicks, according to the materials chosen, manufacturing methods, etc.

A participative platform.

"For this project, brands were involved in all stages of the project’s development: questionnaires, interviews, workshops, etc. This gave many opportunities to hear and note their needs and advice for developing a tool that meets their expectations in terms of content and format”, concludes Adèle Routhiau. Eco design won’t exist without its users, the clothing and footwear brands. Their experience is worth sharing and will constitute the backbone of tomorrow’s Eco design platform! "

www.re-fashion.fr/eco-design/fr
a.routhiau@ecotlc.fr
WHAT DID THEY BECOME?

Spotlight on 4 Innovation Challenge winners: At what stage are they now and what are their next steps? Let’s return to the innovative ideas that are becoming a reality...

RECYC’LAB

Isabelle Dayde
Manager at Auchan
idayde@auchan.com

From telephone cases to daily objects.

Telephone cases made from recycled textiles: this was Auchan Retail France’s Recyc’lab project, thanks to a thermal induction process by the industrial plastic specialist, Roctool. “We managed to obtain a satisfactory thermofomed material, the case existed!” happily says Isabelle Dayde. “However, it became clear that for the case to adhere well to the telephone, we had to carry out an additional injection of plastic into our material. This required a significant but unprofitable, financial investment. Indeed, as telephones change shapes every year it was impossible to have a return on investment for two types of moulds over such a short period of time.” As the material existed, Auchan started to think about manufacturing products that only required a single mould. Several areas then opened up: decorative items, trays, hangers, etc. The Recyc’lab project is therefore going to continue and develop with new products, as soon as the health crisis is over.

A new plastic has arrived!

The ecological plastic project funded by Eco TLC in the 2017 Innovation Challenge under the name of Plax’tile, has really progressed! This new material made from textile waste (up to 40% pure or mixed textiles) and an oil-based or natural origin mould is now called Plaxtil and was officially presented at the end of October 2019 at the K2019 trade show in Düsseldorf, the plastics industry’s main event. “The commercial brand was created as well as the internet site and communication around the product” explained Charlotte Wallet and Olivier Civil. “We are now prospecting the market for companies who have textile waste to recycle and are offering them a comprehensive and circular solution. With their textile waste we are offering to replace traditional plastic objects that they have with new ones made from ecological plastic.” Negotiations are underway with several marketers, with manufacturers, etc. The waste from the milliner, Crambes, is transformed into a hard supporting medium for the inside of caps. Visors, door openers, sanitizing gel bottles, coat racks and open front storage boxes are also available. Our aim for 2020 is to produce 250 tonnes of Plaxtil from 100 tonnes of textile waste”, conclude Charlotte Wallet and Olivier Civil. There are plans for a dedicated production line to be created in the CDA development factory, Plaxtil’s parent company.

RECYCLED JEANS AND CELL-JEANS

David Leromain
Equipe 1083 Innovation
R&D Manager
david@1083.fr

The gradual industrialisation of jeans made from 100% recycled cotton

A winner of the 2016 Eco TLC Innovation Challenge, the 100% recycled cotton jeans project by Equipe 1083 is finished. “It’s a success”, says David Leromain, very pleased. “We’ve created 2 yarns, first a 75% recycled cotton - 25% virgin cotton one and then a 100% recycled cotton one. We then launched the “Moncoton” project, winner of the ADEME’s innovation competition in their Investissements d’Avenir programme in 2019, that aims at industrialising our process”. Also, Equipe 1083 is currently acquiring machines in order to be able to produce a much larger quantity of yarn at the beginning of 2021. “We are scaling up and by 2022 we will be able to offer jeans made from 100% recycled cotton”, concludes David Leromain.

A second project, Cell-Jeans, a winner of the 2017 Innovation Challenge is onging. This involves manufacturing a new yarn from the cellulose in used jeans. Indeed, fibres obtained from unravelling are often too short to be used in traditional spinning and Equipe 1083 wants to extract the cellulose in order to manufacture new regenerated fibres. “Cell-Jeans is therefore an entirely complementary project to the 100% recycled cotton jeans project”, emphasises David Leromain. “By working with the CANOE technological hub located in Pessac, we have managed to obtain a yarn that we are currently looking to optimise. Indeed, the CANOE equipment is sized to produce a thick yarn whereas we require thin yarns. Today, we are looking for a partner who has this technology in order to progress. Unfortunately, none exists in France. Discussions are being held with several companies in Europe, to implement the industrialisation of this yarn produced from the cellulose of used jeans”. Watch this space...

PLAXTIL

Charlotte Wallet
Textile Project Coordinator at Audacie
c.wallet@audacie.org

Olivier Civil
Business Development Manager
olivier@plaxtil.com

Tests on an industrial scale.

With the Design for Repair project, Eram aimed at developing a new footwear design and manufacturing process that would enable all the components of footwear to be easily disassembled at end of life in order to be recycled. “We are currently filing patents and carrying out tests on an industrial scale for two product categories: boots and sneakers”, explains Gauthier Bedek R&D Manager at La Manufacture Eram. “The technology (glue formulation to assemble the upper and sole of footwear) and pilot tests have been validated”. We are presently working with our suppliers on the recycling process. The question is how can end-of-life soles be returned in order to reintegrate them into new products? What is the maximum percentage that can be reintegrated into new soles? How profitable would this be? We reach one brick in this circular economy project and we must now close the loop with all the chain’s stakeholders”, in the 3rd quarter of 2020 we will start to collect used footwear and carry out large scale tests. Lastly, having studied all the possible options to capitalise on our footwear disassembly process Eram is launching a reconditioned footwear collection, “As New”, after having been rented out in the “Atelier Biscage” service; and Sesilile, a range of eco-designed sneakers that can be disassembled, repaired and recycled.

DESIGN FOR REPAIR

Gauthier Bedek
R&D Manager at La Manufacture Eram
gbedek@1aram.fr

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LET’S RETURN TO THE INNOVATIVE IDEAS THAT ARE BECOMING A REALITY...
#### OVERVIEW OF PROJECTS FUNDED BY ECO TLC SINCE 2010 WITHIN THE INNOVATION CHALLENGE

<table>
<thead>
<tr>
<th>N°</th>
<th>Name of project leader</th>
<th>Project</th>
<th>Contact</th>
<th>Mail</th>
<th>RFP year</th>
<th>Strat. area</th>
<th>Status</th>
<th>CLF category</th>
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<tbody>
<tr>
<td>1</td>
<td>BIC ISOTEX</td>
<td>Developing an innovative textile insulation.</td>
<td>Michel KEKAYAS</td>
<td><a href="mailto:m.kekayas@obicic.fr">m.kekayas@obicic.fr</a></td>
<td>2010</td>
<td>2010</td>
<td>Footwear</td>
<td>Textiles, Footwear</td>
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<tr>
<td>2</td>
<td>NOVAFLOOR NOVATEX</td>
<td>Incorporating end-of-life textiles as inert fillers in decorative plates.</td>
<td>Vincent FORGET</td>
<td><a href="mailto:vlf@ecolomy.com">vlf@ecolomy.com</a></td>
<td>2010</td>
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<td>Textiles</td>
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<tr>
<td>3</td>
<td>DECATHLON OXYLANE</td>
<td>Manufacturing polyester yarn from post-consumer polyester textiles.</td>
<td>Raffaele DUBY</td>
<td><a href="mailto:raffaele.duby@decathlon.com">raffaele.duby@decathlon.com</a></td>
<td>2010</td>
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<td>Textiles, Footwear</td>
</tr>
<tr>
<td>4</td>
<td>POLÉ ÉCO-INDUSTRIES POITOU-CHARARENTES MULTITEX</td>
<td>Developing a process for chemical separation of used mixed textiles.</td>
<td>Damien DELETRAZ</td>
<td><a href="mailto:d.deletraz@pole-ecoindustries.fr">d.deletraz@pole-ecoindustries.fr</a></td>
<td>2011</td>
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<td>Textiles, Footwear</td>
</tr>
<tr>
<td>5</td>
<td>FILATURES DU PARC FILATURES DU PARC</td>
<td>Manufacturing recycled wool yarns of the same quality as yarns made with virgin wool fibres.</td>
<td>Fabrice LODETTI</td>
<td><a href="mailto:filatures.parc@wanadoo.fr">filatures.parc@wanadoo.fr</a></td>
<td>2011</td>
<td>2011</td>
<td>Textiles</td>
<td>Textiles, Footwear</td>
</tr>
<tr>
<td>6</td>
<td>TRUCS-TROUVALLES TRUCS-TROUVALLES</td>
<td>Recycling rubber soles into new soles.</td>
<td>Sylvie DAMERON</td>
<td><a href="mailto:sylvie.dameron@gmail.com">sylvie.dameron@gmail.com</a></td>
<td>2011</td>
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<td>Textiles, Footwear</td>
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<tr>
<td>7</td>
<td>AGENCE AIR COOP FOOTWEAR RECYCLING PROJECT</td>
<td>Developing and testing an industrial grinding and separation process in view of creating a footwear recycling pilot line.</td>
<td>Benjamin MARIAS</td>
<td><a href="mailto:bm@air.coop">bm@air.coop</a></td>
<td>2012</td>
<td>2012</td>
<td>Textiles</td>
<td>Textiles, Footwear</td>
</tr>
<tr>
<td>8</td>
<td>FRAMIREX VARIOCOVER</td>
<td>Developing an exterior sound insulation shield in lightweight concrete integrating post-consumer textile fibres.</td>
<td>Mehdi ZERROUG</td>
<td><a href="mailto:mehdi.zerroug@ecotextile.fr">mehdi.zerroug@ecotextile.fr</a></td>
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<tr>
<td>9</td>
<td>FEYECON SEPALEX DECOTEX 1</td>
<td>Developing an undyeing process for used polyester clothes to enable their recycling.</td>
<td>Daniela TRAMBITAS</td>
<td><a href="mailto:daniela.trambitas@feyecon.com">daniela.trambitas@feyecon.com</a></td>
<td>2012</td>
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<tr>
<td>10</td>
<td>CC PAYS DE CO-LOMBREY &amp; SUD TOULOIS RECYTEX</td>
<td>Technical, economical and commercial feasibility study of creating a rigid decorative tile integrating 20 to 50% of used textiles.</td>
<td>Raphael KUENY</td>
<td><a href="mailto:raphael.kueny@univ-lorraine.fr">raphael.kueny@univ-lorraine.fr</a></td>
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<tr>
<td>11</td>
<td>PRÉMICES &amp; CO. BETON DE CHIFFON</td>
<td>Creating a range of decorative acoustic products entirely made from recycled textiles.</td>
<td>Amandine LANGLOIS</td>
<td><a href="mailto:amandine@premicesandco.com">amandine@premicesandco.com</a></td>
<td>2013</td>
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<tr>
<td>12</td>
<td>Mapea ÉCO-CHARGES</td>
<td>Recycling of used cotton and polycotton clothes for use as reinforcement in the plastics industry.</td>
<td>René GENILLON</td>
<td><a href="mailto:r.genillon@mapea.com">r.genillon@mapea.com</a></td>
<td>2013</td>
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<tr>
<td>13</td>
<td>LE RELAIS EKOROOM</td>
<td>Developing acoustic suspended ceiling tiles from recycled textiles.</td>
<td>Jean-Paul LOPEZ</td>
<td><a href="mailto:jlopez@lerelais.org">jlopez@lerelais.org</a></td>
<td>2014</td>
<td>2014</td>
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<tr>
<td>14</td>
<td>FILATURES DU PARC PARCOT</td>
<td>Developing a defibration method for recycling used polycotton clothes into materials suitable for weaving or knitting new clothing products.</td>
<td>Fabrice LODETTI</td>
<td><a href="mailto:filatures.parc@wanadoo.fr">filatures.parc@wanadoo.fr</a></td>
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<tr>
<td>15</td>
<td>MINOT RECYCLAGE TEXTILE MINOT RECYCLAGE TEXTILE</td>
<td>Optimising the end-of-life textiles recycling process in order to achieve a higher percentage of used textiles in the garnetting process.</td>
<td>Jean-Luc DUSART</td>
<td><a href="mailto:jldussart@lerelais.org">jldussart@lerelais.org</a></td>
<td>2014</td>
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<td>Textiles, Footwear</td>
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<tr>
<td>16</td>
<td>CHAUSSETTES ORPHELINES ANIMA</td>
<td>Recycling used socks into a recycled yarn for use in hosiery.</td>
<td>Marta DE CARVALHO</td>
<td><a href="mailto:contact@marciaedecarvalho.fr">contact@marciaedecarvalho.fr</a></td>
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<td>2014</td>
<td>Textiles</td>
<td>Textiles, Footwear</td>
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<td>17</td>
<td>WECOSTA SILENCIO</td>
<td>Developing an eco-friendly acoustic silencer for housing ventilation systems.</td>
<td>Hugues BROUZE</td>
<td><a href="mailto:hbroute@wtxautomotive.com">hbroute@wtxautomotive.com</a></td>
<td>2015</td>
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<tr>
<td>18</td>
<td>IN SOFT ECTOR</td>
<td>Developing an eco-designed shoe with a knitted fabric upper.</td>
<td>Patrick MAINGUENÉ</td>
<td><a href="mailto:pamainguene@in-sof.fr">pamainguene@in-sof.fr</a></td>
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<td>19</td>
<td>IN SOFT ECTOR SE RECYCLE</td>
<td>Recycling the Ector eco-designed shoes.</td>
<td>Patrick MAINGUENÉ</td>
<td><a href="mailto:pamainguene@in-sof.fr">pamainguene@in-sof.fr</a></td>
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<td>20</td>
<td>SYNERGIES TLC AUTOTRI</td>
<td>Studying and developing a new sorting method for non reusable textiles in order to use these secondary materials.</td>
<td>Thomas FRAINEUX</td>
<td><a href="mailto:thomas.fraineux@synergieslcl.fr">thomas.fraineux@synergieslcl.fr</a></td>
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<td>21</td>
<td>SEPALEX DECOTEX 2</td>
<td>Moving the Déco Tex I project (FEYECON) - supercritical CO₂ undyeing technology to pilot scale.</td>
<td>Daniela TRAMBITAS</td>
<td><a href="mailto:daniela.trambitas@feyecon.com">daniela.trambitas@feyecon.com</a></td>
<td>2015</td>
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<td>Textiles, Footwear</td>
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<tr>
<td>22</td>
<td>LA MANUFACTURE EROM DESIGN FOR REPAIR</td>
<td>Developing a new design and manufacturing process allowing for easy disassembly of all components in a shoe at end of life.</td>
<td>Gauthier BEDEK</td>
<td><a href="mailto:gbedek@eram.fr">gbedek@eram.fr</a></td>
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### Eco-design of products in the CLF industry.

#### Recycling into other industries.

Incorporation of materials coming from CLF sectors.

Preparation of materials for recycling.

### Project name  
Project Contact  
Mail  
RFP year  
Strat. area  
Status  
CLF category

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<tr>
<td>26</td>
<td>David LEROMAIN</td>
<td>L’ÉQUIPE 1083 JEANS RÉCUPÉRÉS</td>
<td>Developing a recycled cotton yarn from old jeans.</td>
<td><a href="mailto:dle1083@1083.fr">dle1083@1083.fr</a></td>
<td>2017</td>
<td>Footwear</td>
<td>Completed</td>
<td>Textiles</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>Valeran HIEL</td>
<td>SILAC INDUSTRIE ECO3F</td>
<td>Making a range of acoustic insulation for the automotive industry from used textile materials.</td>
<td><a href="mailto:vhiel@silacindustrie.com">vhiel@silacindustrie.com</a></td>
<td>2016</td>
<td>Textiles</td>
<td>Completed</td>
<td>Textiles</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>Philippe MESNAGE</td>
<td>IFTH / UTT / LE RELAIS CAREFIL</td>
<td>Improving the quality of yarns made from recycled used clothes.</td>
<td><a href="mailto:pmesnage@ifth.org">pmesnage@ifth.org</a></td>
<td>2017</td>
<td>Textiles</td>
<td>Completed</td>
<td>Textiles</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>Roland GUBERT</td>
<td>CID PROCESS CID PROCESS</td>
<td>Mechanical separation of cotton and elastane in used jeans.</td>
<td><a href="mailto:roland.gubert@wanadoo.fr">roland.gubert@wanadoo.fr</a></td>
<td>2017</td>
<td>Textiles</td>
<td>Completed</td>
<td>Textiles</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>David LEROMAIN</td>
<td>L’ÉQUIPE 1083 CELL JEANS</td>
<td>Wet-spinning cotton waste from used jeans in order to create a man-made cellulose fibre</td>
<td><a href="mailto:dle1083@1083.fr">dle1083@1083.fr</a></td>
<td>2017</td>
<td>Textiles</td>
<td>Completed</td>
<td>Textiles</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>Benjamin CAMY</td>
<td>CAMY MODEI</td>
<td>Designing and developing a modular, monomaterial and recyclable shoe.</td>
<td><a href="mailto:benjamin.camy@hodei.fr">benjamin.camy@hodei.fr</a></td>
<td>2017</td>
<td>Footwear</td>
<td>Completed</td>
<td>Textiles</td>
<td></td>
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<tr>
<td>33</td>
<td>Charlotte WALLET</td>
<td>AUDACIE PLASTILE</td>
<td>Recycling used non-reusable textiles into plastic resins.</td>
<td><a href="mailto:c.wallet@audacie.org">c.wallet@audacie.org</a></td>
<td>2017</td>
<td>Textiles</td>
<td>Completed</td>
<td>Textiles</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>Virginie AYMARD</td>
<td>AGENCE AIR COOP REVIVE/RECYCLE</td>
<td>Setting up a pilot project for repairing used clothes and preparing them for recycling.</td>
<td><a href="mailto:va@air.coop">va@air.coop</a></td>
<td>2017</td>
<td>Textiles</td>
<td>Completed</td>
<td>Textiles</td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>Éric BOEL</td>
<td>LES TISSAGES DE CHARLIEU LES TISSAGES DE CHARLIEU</td>
<td>Improving, in terms of technology and industrial process, an article entirely made of recycled post-consumer polyester from Europe, and assessing the difference between the cost price and the market price.</td>
<td><a href="mailto:e-boel@ltc-jacquard.com">e-boel@ltc-jacquard.com</a></td>
<td>2017</td>
<td>Textiles</td>
<td>Completed</td>
<td>Textiles</td>
<td></td>
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<tr>
<td>37</td>
<td>Isabelle DAYDE</td>
<td>AUCHAN RECYCLAB</td>
<td>Recovering fibres from end-of-life clothing into mobile phone cases using the Recltool Induction heating technology.</td>
<td><a href="mailto:idayde@auchan.fr">idayde@auchan.fr</a></td>
<td>2018</td>
<td>Textiles</td>
<td>In progress</td>
<td>Textiles</td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>Stéphanie BAILLY</td>
<td>DECATHLON 48FD</td>
<td>Developing a pilot to achieve textiles’ traceability, allowing for their end-of-life management, thanks to the RFID technology.</td>
<td><a href="mailto:stephanie.bailly@decathlon.com">stephanie.bailly@decathlon.com</a></td>
<td>2018</td>
<td>Textiles</td>
<td>Completed</td>
<td>Textiles</td>
<td></td>
</tr>
<tr>
<td>39</td>
<td>Zaratiana MANDRARA</td>
<td>FCBA MOBIOTEX</td>
<td>Assessing the possibilities of using recycled textile fibres as an essential component of wood framed constructions.</td>
<td>Zaratiana.Mandrara@fcbা.fr</td>
<td>2018</td>
<td>Textiles</td>
<td>Completed</td>
<td>Textiles</td>
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</tr>
<tr>
<td>40</td>
<td>MAXIMUM TISSIUM</td>
<td>MAXIMUM TISSIUM</td>
<td>Developing a rigid material made from textile waste fibres intended for furniture manufacturing for the tertiary sector.</td>
<td><a href="mailto:rome@maximum.paris">rome@maximum.paris</a></td>
<td>2018</td>
<td>Textiles</td>
<td>Awarded</td>
<td>Textiles</td>
<td></td>
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<tr>
<td>41</td>
<td>Julie RAFFON-JOLIVET</td>
<td>TECHTERA JEPLAN</td>
<td>Assessing the reliability of an implantation project in France of a JEPLAN’s plant for recycling used polyester textiles into recycled PET pellets.</td>
<td><a href="mailto:jrafton@techtera.org">jrafton@techtera.org</a></td>
<td>2018</td>
<td>Textiles</td>
<td>Awarded</td>
<td>Textiles</td>
<td></td>
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<tr>
<td>42</td>
<td>Frédéric LOGEZ</td>
<td>VERT-TICAL NORD ECO-LOGIC WALL</td>
<td>Developing a green wall using recycled textiles to replace substrates and sphagnum (natural moss) currently used.</td>
<td><a href="mailto:contact@vert-tical.fr">contact@vert-tical.fr</a></td>
<td>2019</td>
<td>Textiles</td>
<td>Awarded</td>
<td>Textiles</td>
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<tr>
<td>43</td>
<td>Hugues BROUTÉ</td>
<td>WECOSTA QWIT</td>
<td>Developing solutions to improve the acoustic comfort in public spaces (offices, industrial premises, etc.) by using ecological materials including materials from the used textiles sector.</td>
<td><a href="mailto:hbroute@wetautomotiwe.com">hbroute@wetautomotiwe.com</a></td>
<td>2018</td>
<td>Textiles</td>
<td>Awarded</td>
<td>Textiles</td>
<td></td>
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<tr>
<td>44</td>
<td>Hervé GUERRY</td>
<td>CYCL-ADD TEXTIC</td>
<td>Developing a recycling process for used non-reusable polyamide clothing, including sorting, trimming, characterisation, micronization and compounding for plastics making.</td>
<td><a href="mailto:hgurry@cycl-add.fr">hgurry@cycl-add.fr</a></td>
<td>2019</td>
<td>Textiles</td>
<td>Awarded</td>
<td>Textiles</td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>Clarisse MERLET</td>
<td>FABBREICK FABBRECK</td>
<td>Developing a structural, insulating and aesthetic construction material from recycled used textiles.</td>
<td><a href="mailto:cm.fabbrick@gmail.com">cm.fabbrick@gmail.com</a></td>
<td>2019</td>
<td>Textiles</td>
<td>Awarded</td>
<td>Textiles</td>
<td></td>
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<tr>
<td>46</td>
<td>Fabricio LODETTI</td>
<td>FILATURES DU PARC PAMREC</td>
<td>Recycling used polyamide clothes into a recycled yarn for use in textile products.</td>
<td><a href="mailto:filatures.parcc@wanadoo.fr">filatures.parcc@wanadoo.fr</a></td>
<td>2019</td>
<td>Textiles</td>
<td>Awarded</td>
<td>Textiles</td>
<td></td>
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<tr>
<td>47</td>
<td>Anne-Céline HUMEAU</td>
<td>HUMEAU BEAUPRÉAU REBOOT</td>
<td>Pre-study on the feasibility and cost of recycling used PVC footwear, and testing of a recycling loop with defining specifications for setting up the recycling loop at an industrial scale.</td>
<td><a href="mailto:ac.humeau@boppy.fr">ac.humeau@boppy.fr</a></td>
<td>2019</td>
<td>Textiles</td>
<td>Awarded</td>
<td>Textiles</td>
<td></td>
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<tr>
<td>48</td>
<td>Eric DURIVAULT</td>
<td>IDELAM RECHAUSS</td>
<td>Developing an innovative technology for delaminating shoes (leather/textile) by supercritical fluid and a new recycling loop for used shoes.</td>
<td><a href="mailto:eric.durivault@idealtechnologies.fr">eric.durivault@idealtechnologies.fr</a></td>
<td>2019</td>
<td>Textiles</td>
<td>Awarded</td>
<td>Textiles</td>
<td></td>
</tr>
<tr>
<td>49</td>
<td>Ludovic BIDET</td>
<td>LE SLIP FRANÇAIS LE SLIP CIRCULAIRE</td>
<td>Developing a yarn containing the highest possible % of recycled cotton with a fineness up to 1/60Nm from used underwear and socks for use in the making of Le Slip Français® products.</td>
<td><a href="mailto:ludovicbidet@leslipfrancais.fr">ludovicbidet@leslipfrancais.fr</a></td>
<td>2019</td>
<td>Textiles</td>
<td>Awarded</td>
<td>Textiles</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>Jennifer WEIMMERSKIRCH</td>
<td>SOFILA REST</td>
<td>Development of a recyclable and sustainable stretch yarn</td>
<td><a href="mailto:proj@billion-mayor.com">proj@billion-mayor.com</a></td>
<td>2019</td>
<td>Textiles</td>
<td>Awarded</td>
<td>Textiles</td>
<td></td>
</tr>
<tr>
<td>51</td>
<td>Clara POTTON</td>
<td>SYNERGIES TLC UTILE</td>
<td>Feasibility study of setting an industrial unit for the trimming and sorting of used cotton, polyestere and polyamide textiles (100% and blends), based on materials specifications defined with recyclers.</td>
<td><a href="mailto:c.potton@synergies-tlc.fr">c.potton@synergies-tlc.fr</a></td>
<td>2019</td>
<td>Textiles</td>
<td>Awarded</td>
<td>Textiles</td>
<td></td>
</tr>
<tr>
<td>52</td>
<td>Maurits VANDEPUTTE</td>
<td>VALVAN TRIMCLEAN</td>
<td>Development of an automated integrated solution that allows the removal of trims (including labels, buttons, zippers etc.) from used clothing.</td>
<td><a href="mailto:Maurits.Vandeputte@valvan.com">Maurits.Vandeputte@valvan.com</a></td>
<td>2019</td>
<td>Textiles</td>
<td>Awarded</td>
<td>Textiles</td>
<td></td>
</tr>
</tbody>
</table>
THE 2019 INNOVATION CHALLENGE

9 WINNERS

Cycl-add
Fab BRICK
FDP
GROUPE HB
IDELAM
Le Slip Français
MADE IN FRANCE
SOFILA
SYNERGIES TLC
valvan
baling systems

TOTAL AMOUNT OF FUNDING

€729,307

innovation #09
Re_fashion