



ROADS TO INNOVATION

JUNE 2015

ECO TLC
L'éco-organisme du textile - du linge - de la chaussure



EDITORIAL

**“Alone, you go faster.
Together, we go further.”**

Collection, sorting and the different forms of recovery, recycling and reuse of used clothing, shoes and household textiles are becoming more and more prevalent.

300,000 tons of clothing, household textiles and shoes will be reused or recycled in 2019, which means almost 5 kilos per inhabitant. This represents substantial potential business for markets for the 2nd life of the products and materials that they cover.

To this end, Eco TLC promotes research and development of solutions that contribute to the emergence and growth of these markets. Innovation is often the fruit of a long procedure that undergoes many trials and errors before discovering the right approach. This is why Eco TLC encourages experiments, backs development and welcomes sharing of successes and difficulties.

Organising the transition of the textile sector towards a more circular economy means further integration of the management of resources that are not infinite. This is why recovery, recycling and reuse of used products should be linked to eco-design of new products. This closed-loop logic (within the same application) or open-loop (open towards other applications) aims to replace virgin material with recycled material

whenever possible. Discussing, building upon and increasing this knowledge is the goal that drives the different committees established by Eco TLC.

The Scientific Committee set up in 2010 and, more recently, the Materials Composition Sorting Committee embody this potential cooperation between players in the sector, who demonstrate the will to do so, whether they are producers, distributors, collectors, sorters, recyclers, local authorities, but also teachers, researchers, technical or economics experts... They first take part in a process of consultation, which encourages networking and match-making, then the sharing of concerns and finally provides the consistency of a common solution.

These committees and their work are key to the setting up of discussion forums, which will progressively encourage all the players involved to share their experiences and thus contribute towards richer and more open innovation.

“Alone, you go faster. Together, we go further.” This is our message in the 2015 edition of Roads to Innovation, which will introduce 18 ‘trailblazers’, including the five new projects from 2014.

Jean-Luc Bartharès,
Director of Member Relationships and R&D

Did you Know?

Eco TLC sees innovation as central to project for the sector. It is the reason why, as part of the new accreditation, the funding package allocated to it has been doubled, thus increasing from €250,000 to €500,000 per year.

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A Scientific Committee to select R&D projects supported by Eco TLC

On the occasion of the 5th call for projects in 2014, five new projects were chosen by Eco TLC, bringing the total number to 18 since the initiative was launched in 2010.

Selecting the projects











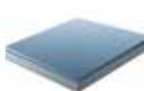











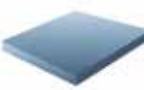



The Scientific Committee is made up of 14 members who represent the stakeholders, direct and indirect, from the sector: marketers, Ademe, representatives from collectors, sorting and recovery companies,

technical centres for textiles and leather, industry organisations and experts (specialist consultant, academic researcher).

The Scientific Committee has drawn up a rating table for projects, consisting of 11 different criteria, scored from 0 (no detail) to 4 (very good): environmental benefits of the project, economic impact on the sector etc. The process involves two stages: the Scientific Committee draws up a short list of applications by

Projects overview: 18 projects supported by Eco TLC

OPEN LOOP PROJECTS

↓ COMPANY	↓ GOAL	↓ TLC COVERED	↓ RESULT	↓ PROGRESS OF IMPLEMENTATION	PAGE
	Develop an innovative textile insulation			Call for projects launched in 2010 DURATION: 5 MONTHS ENDED: JANUARY 2011	14
	Incorporating end of life textiles as inert fillers in decorative plates			Call for projects launched in 2010 DURATION: 16 MONTHS ENDED: MAY 2014	14
	Develop an industrial grinding and separation process to find added value recycling outlet			Call for projects launched in 2012 DURATION: 14 MONTHS ENDED: JULY 2014	9
	Finalise a type of sound insulation out of light concrete			Call for projects launched in 2012 DURATION: 48 MONTHS ENDED: MARCH 2015	10
	Create a new plastic using textile as a inert fill			Call for projects launched in 2012 DURATION: 14 MONTHS ENDED: JUNE 2014	14
	Making use of old clothes made of cotton and cotton/polyester fabrics as reinforcing fillers in the formulation of innovative plastic materials	 COTTON COTTON/POLYESTER		Call for projects launched in 2013 DURATION: 21 MONTHS END PROJECTED FOR DECEMBER 2015	13
	Implementation of the concept to deliver a product for marketing on an industrial scale that is simultaneously visually attractive, ecofriendly and effective			Call for projects launched in 2013 DURATION: 20 MONTHS END PROJECTED FOR DECEMBER 2015	12
	Development of tiles for suspended acoustic ceilings			Call for projects launched in 2014 DURATION: 18 MONTHS END PROJECTED FOR OCTOBER 2016	7
	Improving the purity of the resulting materials (leather and rubber powders) and increasing the output of the process by refining automation of the recycling line			Call for projects launched in 2014 DURATION: 24 MONTHS END PROJECTED FOR DECEMBER 2016	6

grading them according to the various criteria. Applicants who have been shortlisted will then be interviewed by the Scientific Committee. After these interviews, the Scientific Committee will pass their recommendation to Eco TLC board, which will make the final decision on both the funding and the total amount.

Encouraging innovation by supporting R&D projects


















Projects that are supported

Since innovation is at the heart of the project for the sector, Eco TLC has doubled the budget dedicated to funding for R&D projects, as part of 2014-2019 accreditation. Each call for project (available in French and in English) is open to all types of actors. The aim is

research into new outlets for used clothing, footwear and household linen or to improve the different procedures that achieve a reduction in processing costs. The chosen projects are all followed by a monitoring group (progress meetings and validation of stages).

CLOSED LOOP PROJECTS

↓ COMPANY	↓ GOAL	↓ TLC COVERED	↓ RESULT	↓ PROGRESS OF IMPLEMENTATION	PAGE
	Manufacture of polyester yarn from post-consumer polyester clothing, shoes and household linen	 POLYESTER		Call for projects launched in 2010 DURATION: 36 MONTHS ENDED: JUNE 2014	14
	Transform used woven material made out of wooly fibers into new yarns of the same quality	 WHOOOL		Call for projects launched in 2011 DURATION: 18 MONTHS ENDED: APRIL 2014	14
	Recycle rubber soles into a new product			Call for projects launched in 2011 DURATION: 13 MONTHS ENDED: JUNE 2014	14
	Using old clothes made of cotton/ polyester to spin recycled materials employing a method of defibration that is suitable for weaving or knitting new articles of clothing made of textiles	 COTTON/POLYESTER		Call for projects launched in 2014 DURATION: 30 MONTHS END PROJECTED FOR OCTOBER 2017	5
	Developing (improving the gauge) a recycled yarn for hosiery using odd or damaged socks or socks with holes in them			Call for projects launched in 2014 DURATION: 15 MONTHS END PROJECTED FOR JULY 2016	4

SEPARATION AND PREPARATION TECHNIQUES

↓ COMPANY	↓ GOAL	↓ TLC COVERED	↓ RESULT	↓ PROGRESS OF IMPLEMENTATION	PAGE
	Develop a chemical process to separate synthetic and natural fibers	 MIXED FIBRES		Call for projects launched in 2011 DURATION: 15 MONTHS ENDED: SEPTEMBER 2013	14
	Develop a un-dye process for polyester fabric based to enable its recycling	 POLYESTER		Call for projects launched in 2012 DURATION: 25 MONTHS ENDED: JUNE 2015	11
	Develop a chemical process to separate synthetic and natural fibers	 MIXED FIBRES		Call for projects launched in 2013 DURATION: 13 MONTHS END PROJECTED FOR OCTOBER 2015	10
MINOT RECYCLAGE TEXTILE	Improvements in treatment of end-of-life textiles in order to increase the percentage of 'old' textiles in the unravelling process			Call for projects launched in 2014 DURATION: 12 MONTHS END PROJECTED FOR APRIL 2016	8



New projects



MARCIA DE CARVALHO

What gave you the idea of producing yarn from old socks?

It's a long story! I was trained as a designer, specialising in knitwear and yarns. I inherited the tendency towards recycling from my father, who used to recycle his ink cartridges at a time when no one else even thought of doing so. He recycled everything he could and passed on this family trait to me. I designed a collection of clothing entirely made of recycled floor cloths in 1993 and I have remained very much inclined towards recycling in my work. In 2007, I said to myself that socks were a real problem and that someone needed to work on this. I designed a collection of clothes and accessories as a patchwork of recycled socks and I submitted this for the "Paris grand prix for design" in 2008. As I am originally from Brazil and 2009 was the year for France in Brazil, we also established a partnership between French students and Brazilian craftspeople that involved recycling and patchworking with socks. It was not until 2010 that I had the idea of producing yarn from old socks. Today we still make clothes from a patchwork of old socks but this involves one-of-a-kind

➤ Multi-coloured scarf made from yarn from recycled socks and made in France. Tunic and skirt in jersey from "dream of socks" yarn.



Chaussettes Orphelines

Making yarn with socks



Marcia de Carvalho

Fashion designer and founder of Chaussettes Orphelines



articles, so it is difficult to imagine an industrial process, even if it is something we are considering!

Do you expect to produce yarn on an industrial scale?

Yes, it is one of the issues at stake in our partnership with Eco TLC, which I discovered during Lille fabrics trade show. The enthusiasm generated by my sock patchworks led the organisers of the exhibition to recommend that I contact Eco TLC. We however had already made quite some progress with this project. Having had the idea of making socks, fashion accessories and lightweight clothing with yarn made from recycled socks, I looked for industry partners to conduct some tests. I found a French spinning mill that has become my partner. We conducted tests and produced a yarn that we will be selling this year on our website and that we use to design collections that we are already selling in France and throughout the world. Our products are distributed by a chain of shops and one brand in France, and we have obtained a stand at a specialist trade fair in Berlin in addition to partnerships with shops in Britain, Germany, Belgium and Japan that sell ethical products.

What do you aim to achieve in your partnership with Eco TLC?

Now we would like to develop the range of yarns, add variety with colours, design a yarn that is thinner, lighter-weight and made of cotton and not wool. This would also allow us to develop the range of collections created with these yarns.

Is there a social aspect to your business?

Yes, we are located in the Goutte d'Or district of Paris, and since 2002 we have developed an association which transmits the skills related to textiles recycling and design by fostering the

social fabric among the district's residents. Our company gives 10% of its sales to social projects in Goutte d'Or, women's workshops and raising awareness of recycling in schools. The very optimistic aspect of this project has encouraged the media to take a great interest in us and we have been the subject of reporting on all the French TV channels!

PROJECT AT A GLANCE

GOAL: Developing (improving the gauge) a recycled yarn for hosiery using odd or damaged socks or socks with holes in them

DURATION: 15 months (end of July 2016)

LEVEL OF SUBSIDIES FROM ECO TLC: €25,000

TYPE OF TLC COVERED: used socks

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Transforming a thin fabric into recycled yarn



FABRICE LODETTI

What was the motivation for your project?

This is the second project that we are carrying out in conjunction with Eco TLC. The first one enabled us to produce a yarn based on recycled textiles woven in warp and weft, from outerwear made of thick fabric, in a composition of about 90% wool and 10% polyamide, when we had previously only been able to do this from recycled knits. Following the success of this first project, we would like to use a thinner recycled fabric that consequently is far harder to work with. We have given ourselves 30 months to achieve this. Based on our experience, we will need to make considerable modifications to our machinery and those of our partners, and possibly even invest in new equipment.

What phases have you planned?

As with the thicker fabric, we plan on conducting laboratory tests in each phase that are validated by factory tests on our machines. It takes longer, but our experience has taught us that, while a laboratory test may be satisfactory, it may not necessarily be the case under industrial conditions. The inconvenient

aspect is that our machines will be tied up, so we are endeavouring to plan the tests during periods when we are less busy.

Do you have any partners?

Yes, in addition to financial support from Eco TLC, we are working with the collection and sorting operators Le Relais and SRCE to obtain the raw material. They will supply us with a blend of cotton/polyester; this composition is very common in end-of-life textiles, and recycling this dual component is very difficult. The challenges are therefore considerable. We are attempting to obtain a yarn that comes entirely from this intimate blend, but if we fail we are not ruling out the possibility of incorporating other longer and more resistant fibres, such as recycled wool from our first project, for example. We have a partner for defibration but spinning will be done in our company since that is our core business. We also have other partners for weaving and knitting, as the final tests not only involve the recycled yarn that we produce but also clothing made from these yarns.

What do the tests of this clothing involve?

In order to obtain quality specifications that comply with those of our customers in the clothing sector, pilling tests are conducted on clothing woven from our yarns: the fabric is rubbed to measure its resistance to wear.

The stakes in this new project are even higher but we enjoy a challenge!



Fabrice Lodetti

Manager of the family-owned company Les Filatures du Parc

PROJECT AT A GLANCE

GOAL: Making use of old clothes made of cotton/polyester to spin recycled materials employing a method of defibration that is suitable for weaving or knitting new articles of clothing made of textiles

DURATION: 30 months (until October 2017)

LEVEL OF SUBSIDIES FROM ECO TLC: €145,000

TYPE OF TLC COVERED: Cotton/polyester textiles

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Developing the potential for recycling leather/rubber shoes



Benjamin Marias

Founder and manager of AIR -
Innovation Agency



BENJAMIN MARIAS

What is at stake in this new project?

In our last project, which was funded by Eco TLC (2012-2014), we succeeded in separating the different materials in leather/rubber shoes and in identifying potential uses for them with high added value. Today we are attempting to identify and carry out applications with high added value using recycled leather and rubber, with end users (shoe manufacturers, rubber producers, flooring companies, furniture companies, automotive industries, etc.). We can summarize the goals and the anticipated results as follows: output: a fully automatic plant for recycling shoes (from shredding through to segregation of materials); purity: improvement in the standard for segregating leather and rubber (maximum 5% of impurities); developing new markets for reclaimed materials.

What is the expected outcome of this project?

The outcome of this project will lead to the creation of a range of prototypes for recycled leather and rubber products, which will be subjected to mechanical and chemical tests. The goal is to demonstrate that materials obtained from shoes are of sufficient quality for applications with a high added value. Three mini pilot projects for research and development will be carried out with members of the network for final users in order to validate the technical and economic requirements. With this new proposal, we not only want to recycle the supply of used shoes but also to exert influence on the shoe industry to produce shoes that will be easier to recycle.

What method are you employing?

The experience gained in our previous project with Eco TLC taught us that research and development projects

can take longer than planned and that the results may sometimes not be as good as hoped for, even if they are encouraging. In our first project with Eco TLC, we were overly ambitious in hoping to complete the project within 12 months and we were forced to dedicate far more internal resources to it in order to obtain the anticipated results. This was particularly the case with the development of the pilot recycling line, which was far more difficult than expected. By way of an example, the coating stripper required six prototypes. This is why we are proposing a project over 24 months this time.

Our previous work was based to a large extent on an approach of 'push' technology: we had a supply of waste (shoes) that we wanted to recycle and we needed a technology for segregating the shoes and pushing the materials to the market. In this new proposal, we are suggesting a 'pull' approach where we collect information from companies and end users of the products in order to establish the market's requirements for materials.

PROJECT AT A GLANCE

GOAL: improving the purity of the resulting materials (leather and rubber powders) and increasing the output of the process by refining automation of the recycling line

DURATION: 24 months
(until December 2016)

**LEVEL OF SUBSIDIES FROM
ECO TLC:** €188,475

TYPE OF TLC COVERED:
Leather shoes, rubber or leather soles

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▲ Bale of cotton compacted before being shipped to the plant insulation Métisse®

PROJECT AT A GLANCE

GOAL: Development of tiles for suspended acoustic ceilings

DURATION: 18 months (until October 2016)

LEVEL OF SUBSIDIES FROM ECO TLC: €169,740

TYPE OF TLC COVERED: Used textiles

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▲ Thermo-acoustic insulation panels Métisse®

Le Relais

Suspended acoustic ceiling tile made of recycled textiles



JULIE PISKORSKI

What was the initial motivation for your project?

Le Relais, a leader in the collecting and sorting of textiles in France, is always on the lookout for new avenues to recover, recycle and reuse textiles. One example of this constant innovation was the creation of Métisse®, in 2007, thermal-acoustic insulation made of recycled cotton. Boosted by this initial success in the construction sector, we wanted to continue developing our range of 'green' products in order to recycle even more used textiles, and thus generate new jobs.

How did it get started?

We met the firm of Wecosta in 2014, through the Uptex competitiveness cluster, with the aim of setting up a partnership. Wecosta is a manufacturer of automotive components which has specialised in the thermoforming of fibrous materials. It is based in Roubaix (59) and wants to diversify its markets. We quickly recognised the potential of establishing a partnership between both our companies: producing technical, environmental, economic and social benefits. This meeting marked the start of the development project for tiles for suspended acoustic ceilings in the construction sector. We really want to develop an alternative to the suspended acoustic ceiling tiles currently available on the market, which are mostly made of mineral wool. Our alternative will be bio-sourced and have an environmentally friendly design.



Julie Piskorski

Product and Quality
development Manager
at Le Relais Métisse

LE RELAIS

Métisse®
L'isolation durable

What stage have you reached with the project now?

Initial tests have been conducted in order to check that the Métisse® process is compatible with Wecosta's. These initial tests are very promising and have reassured us of our project's feasibility. It has also allowed us to identify several avenues for developing the product.

Since the project is being carried out with Le Relais and Wecosta as partners, this involves teams at these two organisations, both with regard to R&D and also with regard to production and marketing.

What will the next stages be?

The next stage will be the development phase, that is to say perfecting the properties of the product and the design for the special tooling equipment needed. The study into commercial production will also continue, focussing on the product's development as well. We allowed 18 months for the development phase, from the design of the initial prototypes to production of the first pilot, and we hope to start commercial production in 24 months' time.

Improve inclusion of end-of-life clothing in the garnetting branch



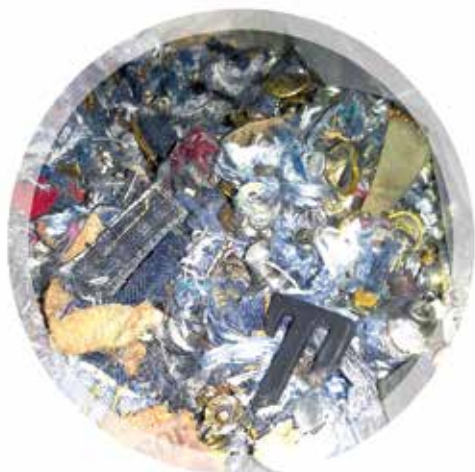
BERTRAND CHERPIN

What does your project involve?

Minot Recyclage Textile (MRT), a French company active in the recycling of textiles for garnetting, has an annual processing capacity of 13,000 to 17,000 tons (offcuts from clothing production, end-of-life clothing, etc.). In conjunction with the collection and sorting of clothing, shoes and household textiles with Le Relais, the challenge is to strengthen the entire sector in order to retain and create new jobs by ensuring outlets for collected and sorted textiles that are not fit to be re-used. The goals of reducing waste, combined with the goals of increasing the collection and sorting of waste, are going to entail an increase in textiles for recycling, which in turn will make it necessary to go further in including this category of textiles (waste termed 'post-consumption') in the garnetting branch.

What is involved?

Garnetting was first conceived to reuse the offcuts from production from textile industries – waste called 'new', as opposed to 'post-consumption' waste



▲ The "hard" items
(buttons, zippers, jeans rivets)

that represents end-of-life clothing. What is typical of 'new' waste (offcuts from clothing production), among other properties, is that it is still free of any foreign bodies and dust. In contrast, an article of end-of-life clothing is composed of, apart from a combination of materials, various non-textile constituents: the 'hard' points (buttons, zips, rivets on jeans). Furthermore, an end-of-life garment, having thus been worn, washed and dried numerous times, has accumulated a certain amount of dust, which will be restored during garnetting. Considering the frictional forces that are exerted to break the garment fibres down, the garnetting mechanism is accompanied by a release of heat, which, combined with a flammable material and with contact with the air (cotton and dust for example) may result in a fire upon the least spark (impact with metal / metal at high impact speeds).

Moreover, access to applications for non-wovens, even spinning, also depends on the lack of dust and foreign bodies in fibres obtained from garnetting.

If, after collection and sorting, the supply of this class of 'post-consumption' material, may be sizeable, it is clear on the other hand that there are many difficulties to be overcome to make it usable.

How do you intend to proceed?

Minot Recyclage Textile is one of the rare garnetting firms in France to have shown, for some years, an interest in post-consumption textile waste as a potential source of materials, in addition to traditional offcuts from textile production. MRT has therefore developed a certain expertise in this field over the years.

To achieve even more progress in absorbing these end-of-life textiles, the first phase of the project will consist of evaluating the maximum potential for assimilating end-of-life textiles with the current programmes, while refining



Bertrand Cherpain

Deputy Head of Operations,
Le Relais

LE RELAIS
nous avons raison de croire en l'Homme

PROJECT AT A GLANCE

GOAL: To find new methods of processing end-of-life textiles in order to increase the tonnage for garnetting

DURATION: 12 months
(until April 2016)

LEVEL OF SUBSIDIES FROM ECO TLC: €38,254

TYPE OF TLC COVERED:
Used textiles

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the properties of the fibre obtained, in collaboration with external research centres and laboratories (e.g. French Institute for Textiles and Apparel (Institut Français du Textile et de l'Habillement, Celabor).

The next stage will involve finding new means of improvement, indeed, depending on the results obtained, ground-breaking 'technology building blocks' that will allow us to keep up with the increased volumes of used clothing.

Ongoing projects:

Where are they at?

The beneficiaries share their experience and the progress in their research.

AIR – Agence Innovation Responsable

Mechanical segregation of the leather from the rubber without human intervention



BENJAMIN MARIAS

How did your project get off the ground?

At the start of 2015, a pilot line for recycling end-of-life dress shoes was installed at SOEX in Wolfen, Germany. The system consists of: a shredder, metal separator, coating stripper and a vibrating table. This group of innovative machinery allows us to segregate leather and rubber mechanically without human intervention.

How did things progress?

The goal of this initial part of the project was very ambitious, whether as regards the budget, schedule or development. This ambitious target led us to make a choice regarding the scope of the project. It was indeed our intention to offer materials from recycling as early on as this first phase of the project. However the work on research and development

took more time than initially planned. By way of an example, six prototypes were needed before obtaining the current coating stripper and three prototypes for the vibrating table.

Have you managed to obtain a satisfactory result?

Thanks to our determination and the expectations of the companies collaborating with us, we were however able to demonstrate very promising results and real potential for the recycling of end-of-life shoes.

Companies from various economic sectors (footwear, furniture, construction, flooring, etc.) have shown a distinct interest in this new process for recycling shoes and, more particularly, in the recycled materials obtained. To sum up, this project in 2013-2014 was only phase 1 (technology push) in our overall plan to recycle end-of-life shoes. Phase 2 (market pull) being the use of the materials generated by the recycling line. The new project backed by Eco TLC for 2015-2017 will thus have as its goal the creation of new materials with a high added value and to incorporate the latter into new applications.



▲ A pilot line for the recycling of post-consumer dress shoes installed at SOEX Wolfen in Germany

“Companies from various economic sectors have shown a distinct interest in this new process for recycling shoes...”



PROJECT AT A GLANCE

GOAL: Developing and testing a method of recycling (shredding and segregation of materials) with the aim of creating a test facility for recycling shoes and for recovery

DURATION: 14 months (until July 2014)

LEVEL OF SUBSIDIES FROM ECO TLC: €86,000

TYPE OF TLC COVERED: Leather shoes, rubber or leather soles

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Combining concrete with textile waste



MEHDI ZERROUG

What is the goal of your project?

As we ourselves run collection and sorting operations, we detest seeing an excess of final textile waste still not being recycled today. We were therefore on the lookout for a method to recover and reuse this waste. In 2010 we had the idea of incorporating it with concrete in order to make insulation material and we therefore launched a research project to uphold this theory.

How did things progress?

We conducted an initial phase of research with funding from the Banque Publique d'Investissement (BPI) France, in collaboration with a specialist research

centre for concrete. We tested different kinds and proportions of concrete and of mixtures with the prepared textiles. The positive results we obtained encouraged us to continue with the tests. In 2014, this time with funding from Eco TLC and ADEME, we carried out a second test phase with our concrete/textile mix for resistance to freezing/thawing, cleaning with detergents, etc.

What stage have you now reached?

We are impatient to obtain the latest test results for the product that we have called "Viacover". The impending results should allow us to proceed to a phase of industrial-scale production and commercialisation.

PROJECT AT A GLANCE

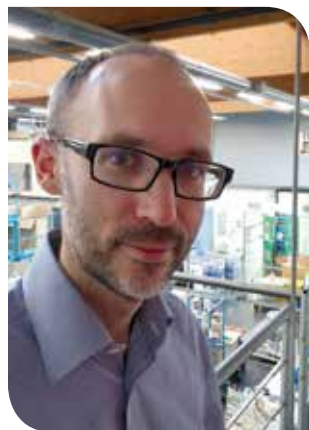
GOAL: Development of an exterior sound insulation shield in lightweight concrete

DURATION: 48 months (until March 2015)

LEVEL OF SUBSIDIES FROM ECO TLC: €53,500

TYPE OF TLC COVERED: Residue from mixed textile sorting

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⬆ Cédric Dever, Directeur Scientific & Commercial Director at Valagro Carbone Renouvelable



Separating the chemical constituents in end-of-life clothing



CEDRIC DEVER

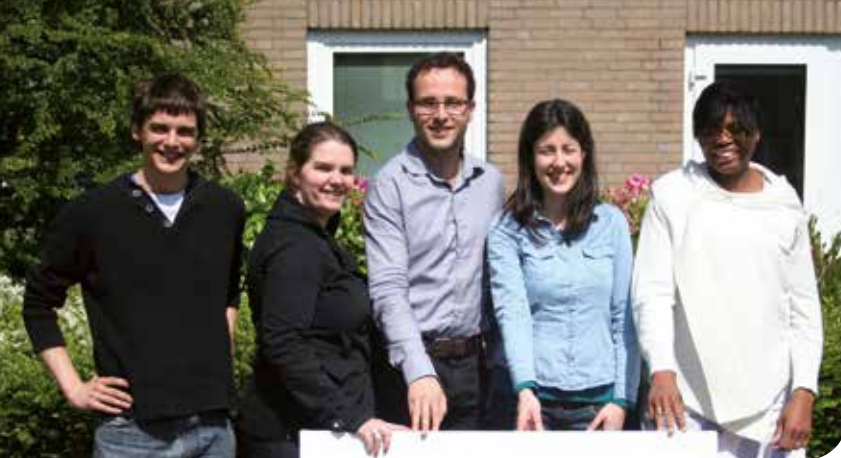
What does your project involve?

Having succeeded in isolating the different chemical constituents in end-of-life clothing from a batch of mixed textiles, we are finalising our results by moving up to a pilot scale for industry.

What phases have you completed so far?

Since signing of the project, Valagro has been working on the 1st phase: improving the individual stages in the process for the pilot scale starting with the raw materials supplied by Valoris Textiles. The people involved are myself as the technical manager of the project,

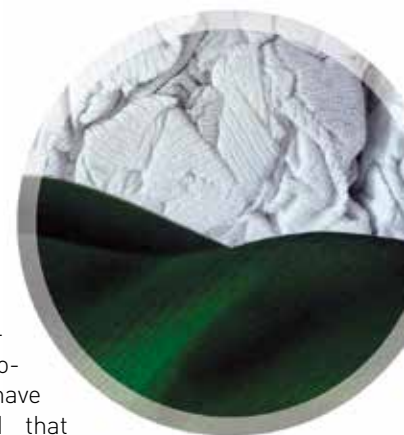
Camille Delugeard as head of the bio-polymer project and Marie Baron and Thomas Pichon are the technicians. This 1st phase was completed in January 2015. We have received backing from the EcoIndustries hub for coordination of this project. We have now entered the 2nd phase which involves validation of the process using three sources (general waste, polyester/cotton blend, polyester/cotton/elastane blend) on a laboratory scale (10 kg/source). After completion of this 2nd phase, we will switch over to the pilot-scale tests (300 kg/resource). These pilots will allow us to establish the production costs for this process, to gauge the size of an industrial production unit and to determine consumption of electricity and raw materials. Along with these pilot tests, a business study will be



Feyecon

Bleaching textiles with CO₂

► Polyester fabric before (green) and after (white) discoloration with supercritical CO₂



▲ The project team from left to right: Jorge Berriatua, Audrey Common, Guillermo Ramas, Lara Gonzales, Audrey Ngomsik-Fanselow



RAPPEL PROJET

GOAL: Developing a solution for bleaching the colour from polyester so that it can be recycled

DURATION: 25 months (until June 2015)

LEVEL OF SUBSIDIES FROM ECO TLC: €188,600

TYPE OF TLC COVERED: Polyester textiles

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AUDREY NGOMSIK-FANSELOW

What was the initial motivation for your project?

The idea behind the project is to recycle polyester by bleaching it or by harmonising the colours of fabrics, using technology that is clean, fast and not expensive. We use carbon dioxide in a supercritical state (SC CO₂). This involves a 'green' solvent that is non-toxic, non-polluting and non-inflammable. What is more, it is widely available in a very pure state at low prices. This method of bleaching would allow products of higher quality to be created than with conventional techniques for recycling. The textile could be re-used, for example, in plastics processing as it would be without dye or have a uniform colour and, above all, it would not be damp.

Can you tell us what has happened, in detail, since last year?

The bleaching of recycled polyester textiles using CO₂ under pressure has been adopted. We have not only demonstrated that this method could be applied to any recycled polyester textile, but we have improved the procedure thanks to

a battery of tests conducted on prototypes. We have demonstrated that this procedure did not have a noticeable effect on the mechanical properties of the textile and we have endeavoured to make it more economical.

What stage have you reached now?

It is a success: the procedure can be applied to all types of recycled polyester waste. Our procedure combines the extraction of disperse dyes in addition to cleaning of the fibres, which simplifies the recycling stages and re-use. Manufacturers will be able to reuse the fibres or melt them down again without preliminary treatment. Polyester represents 80% of synthetic textiles. In parallel with the market for virgin polyester, a new source for procurement will be generated thanks to an increase in recovery, recycling and reuse of end-of-life polyester fibre. Our ambition is to unite the polyester industry's players to promote our procedure and to allow us the means to enable future implementation in industry.

conducted in order to establish the sales prices for the raw materials produced by the procedure.

Did you encounter any problems?

Currently the main problem lies in the wide variety of fibres and treatments for fibres, dyes in particular.

What will the next phases be?

Ultimately for Valagro it is not a question of using this technology itself but of licensing it to an investor to enable it to be exploited on an industrial level. We are currently taking part in a number of events in order to promote this technology.

PROJECT AT A GLANCE

GOAL: Developing a method for chemical separation of textile constituents

DURATION: 13 months (until June 2015)

LEVEL OF SUBSIDIES FROM ECO TLC: €112,917

TYPE OF TLC COVERED: Blends of synthetic / natural fibre textiles

CONTACT: Cédric Dever
cdever@valagro-rd.com / + 33 (0)5 49 45 40 28

Highlighting the worth and aesthetic potential of recycled textiles



AMANDINE LANGLOIS

What was the initial motivation for your project?

Camille Chardayre and I developed Rag Concrete as part of our final degree course in design at the École Boulle in 2012. We had noticed that recycled textiles were often concealed in use and we thought that it might be possible to add value in applications by making the material visible. So we designed an acoustic and decorative material that is composed entirely of recycled textiles and that looks like concrete. It can be applied to any walls where it makes sense to use a material that has aesthetic and acoustic properties: arts centres, media centres, museums, schools, nurseries, hotels, restaurants, offices, visitor centres etc.

What were the different phases in the project after developing the concept?

Camille and I were joined at the Prémices collective by Vivien Renouf, an independent consultant who provided expert advice on the market

research section conducted in 2014. This research turned out to be very positive; we decided to commission Innortex, which specialises in recycling foam and textiles, with adapting the product for manufacture. The research and development work started in February 2015.

What stage has the project now reached?

While research and development continues, we are working on designing an identity for the product and the brand experience. We also foresee the development of new products in future using the same procedure. Rag Concrete will be presented at the Milan Furniture Fair in April 2015. We now cannot wait to see the first industrial prototypes leave the factory to meet the demands of our first customers, who are starting to approach us.

Collectifs Prémices from left to right: Amandine Langlois, Jérémie Triaire, Sophie Decoux, Camille Chardayre

Prémices
architecture - design - graphisme

“ Recycled textiles were often concealed in use... We designed an acoustic and decorative material that is composed entirely of recycled textiles and that looks like concrete. ”

PROJECT AT A GLANCE

GOAL: New range of acoustic products with a visual appeal, made entirely of recycled textiles.

DURATION: 20 months
(until December 2015)

LEVEL OF SUBSIDIES FROM ECO TLC: €49,290

TYPE OF TLC COVERED:
Used textiles

CONTACT: Amandine Langlois
amandine@collectif-premices.com
+ 33 (0)6 77 84 35 49



Incorporating recycled textiles in plastic materials



ESTELLE VILLEGAS

What was the initial motivation for your project?

The aim of the Eco-Charges project is to recover and reuse cotton and cotton/polyester textiles as fibrous fillers for reinforcing plastic materials. This project is part of industrial development, with the ArmorLux brand, Mapea



From left to right: M. Savin - Plastigray, Mme Quendez - Abi 29, Mr. Gueguen - Armor Lux, M. Genillon - Mapea



PROJECT AT A GLANCE

GOAL: Making use of old clothes made of cotton and cotton / polyester fabrics as reinforcing fillers in the formulation of innovative plastic materials

DURATION: 21 months (until December 2015)

LEVEL OF SUBSIDIES FROM ECO TLC: €116,000

TYPE OF TLC COVERED: Cotton and cotton/Polyester textiles

CONTACT: Estelle Villegas
e.villegas@mapea.com
+ 33 (0)4 77 40 18 38

(plastics formulation, compounding) and Plastigray (industrial-scale production and assembly of injection moulded plastic parts). Eco-Charges' goal is to help the textile sector reach its targets in the recycling of end-of-life clothing, shoes and household textiles and reduce the rates of waste destined for landfill.

What have you achieved so far?

The project was launched in April 2014 and in one year much progress has been made: precise identification of the potential sources, setting up experimental collections, verification of batch homogeneity, screening different technologies for processing fibres, completing the mechanical processing that enables rejected fabrics to be converted into fibres that can be used by the plastics industry, compounding PP formulations/cotton/polyester fibres with 20% and 30% fibre, defining the specifications for new materials made from recycling waste textiles, materials characterisation is in progress.

What lessons have you learned from this?

These developments have allowed us to demonstrate several points, in particular that the potential source for cotton and cotton/polyester represents very substantial volumes and that a phase for sorting or for accurate traceability is indispensable. Recycling of used textiles requires several stages in technical processing and each stage needs to be carried out with due care. Otherwise the final properties of the material cannot be guaranteed for our customers. The first compounds have allowed us to demonstrate that incorporating cotton or cotton/polyester fibres is possible in plastic formulations. Their interest in terms of mechanical reinforcement depends on the quality of the formulation and on the compounding process. The goal is to achieve industrial-scale production of these compounds filled using cotton or cotton/polyester fibres and to establish a permanent sector for recycling, recovery and reuse.



Finished projects

2010 PROJECTS

↓ COMPANY	↓ TLC COVERED & GOAL	↓ DURATION & END OF PROJECT
 PROJECT MANAGER: Mr. Kekayas	TLC COVERED: Used clothing and household linens GOAL: Develop an innovative textile insulation	DURATION: 5 months END OF PROJECT: Ended January 2011 TOTAL FUNDING FROM ECO TLC: €34,000
 PROJECT MANAGER: Mr. Forget	TLC COVERED: Textile sorting mixed rejects GOAL: Incorporating end of life textiles as inert fillers in decorative plates	DURATION: 16 months END OF PROJECT: Ended May 2014 TOTAL FUNDING FROM ECO TLC: €32,252
 PROJECT MANAGER: Mr. Ventenat Vincent CONTACT: vincent.ventenat@decathlon.com Tel. +33 (0)6 24 32 04 10 / +33 (0)3 20 33 73 43	TLC COVERED: Polyester fabrics GOAL: Manufacture of polyester yarn from post-consumer polyester clothing, shoes and household textiles	DURATION: 36 months END OF PROJECT: Ended June 2014 TOTAL FUNDING FROM ECO TLC: €286,000







Decathlon → Making yarn with used polyester

Our goal is to produce polyester yarn from production waste and collected end-of-life textiles at a price that is equal to or less than yarn made from virgin polyester. To achieve this, we had to test successive procedures. Two of the issues we encountered were impurities and dyes. We experimented with several

solutions before arriving at a final procedure. At this stage, economic viability for mass production overall remains to be confirmed. We are keeping on with development since, once validated, this solution could involve several thousands of tons.

2011 PROJECTS

↓ COMPANY	↓ TLC COVERED & GOAL	↓ DURATION & END OF PROJECT
 PROJECT MANAGER: Mr. Dever Cédric CONTACT: cdever@valagro-rd.com Tel. +33 (0)5 49 45 40 28	TLC COVERED: Mixed fabrics GOAL: Develop a chemical process to separate synthetic and natural fibers	DURATION: 15 months END OF PROJECT: Ended; project extended for validation at pilot scale TOTAL FUNDING FROM ECO TLC: €32,952
 PROJECT MANAGER: Mr. Lodetti Fabrice CONTACT: filatures.parc@wanadoo.fr Tel. +33 (0)5 63 74 01 64	TLC COVERED: Essentially woven winter clothing made of wool or other mixed fibers GOAL: Transform used woven material made out of wooly fibers into new yarns of the same quality	DURATION: 18 months END OF PROJECT: Ended April 2014 TOTAL FUNDING FROM ECO TLC: €100,000
 PROJECT MANAGER: Mrs Dameron Sylvie CONTACT: sylvie.dameron@gmail.com Tel. +33 (0)1 47 00 66 10	TLC COVERED: Non-reusable shoes soles made of rubber GOAL: Recycle rubber soles into a new product	DURATION: 13 months END OF PROJECT: Ended June 2014 TOTAL FUNDING FROM ECO TLC: €34,980
 PROJECT MANAGER: Mr. Petitdemange CONTACT: Tel. +33 (0)3 83 52 08 16 e-petitdemange@pays-colombey-sudtoulousain.fr	TLC COVERED: All textile end waste GOAL: Create a new plastic using textile as a inert fill	DURATION: 14 months END OF PROJECT: Ended June 2014 TOTAL FUNDING FROM ECO TLC: €43,550



Mélanie Coppens

Project engineer,
RDC Environment



A Materials Sorting Committee to help increase sorting

Developing outlets for recycling used textiles is the stated goal of the “Materials Sorting Committee”, which was established in 2014. It brings together all the stakeholders in the sector in a participatory approach with the aim of developing sorting to produce more raw material from used textiles.

What is materials sorting?

Materials sorting means the finer sorting of specific categories of used clothing, shoes and household textiles by segregating them or separating them into their components (according to material and/or colour) in order to upcycle them into new products or new materials. It is an additional stage in sorting of used clothing, shoes and household linen in order to make them suitable for recycling.

The reason behind the committee

The aim is to establish, in consultation with representatives from sorting and recycling operators, a catalogue of additional processes for materials sorting as well as a scale of financial support linked with the measures for sorting, while ensuring the viability and the relevance of outlets from the technical and economic aspects. Coordinated since October 2014 by RDC Environment, a research and environmental consultancy services firm, the Materials Sorting Committee brings together representatives from the sector who have an interest in this subject, in addition to people from Eco TLC. The Materials Sorting Committee invite to join in its proceedings any person enabling it to clarify and inform its discussions and decisions (e.g. scientific or technical experts in the area of recycling,

buyers of material (spinning mills, cement manufacturers), equipment manufacturers).

3 specific groups ‘Wipers, Yarns, Felts / Insulators’ identified by the committee

Wipers: sorting of mainly white and coloured cotton fabrics in different thicknesses in response to demand for wipers in industry and households.

Yarns: sorting of used clothing, shoes and household linen according to the class of yarn components in response to demand for recyclable yarn for manufacturing new clothing, shoes and household linen (cotton jeans into cotton jeans, woollen pullovers into woollen pullovers, etc.)

Felts/Insulators: sorting of used clothing, shoes and household linen according to class of fibre components in response to demand for recycled fibres in nonwoven applications intended

for padding or for thermal and acoustic insulation for the construction and automotive sectors.

The priority for these groups is to respond to the following key questions: What demand is there from the market? Which type of additional sorting according to standard category is concerned? What are the costs and returns for each sorting stage? And subsequently, which sorting measures need to be supported specifically? Using which supplementary measures if necessary? Research projects to test and validate technical processes are proposed and evaluated. In particular, they are generated and collected by the call for research and development projects described below.

Different sorting technologies

In 2014, WRAP in the United Kingdom conducted a study of the different potential technologies for sorting used clothing, shoes and household textiles. This study made a comparison of manual sorting, sorting using infrared spectroscopy (FTIR), sorting using radio-frequency identification with RFID tags and sorting using 2D barcode readers.

@ SEE LINK: <http://www.wrap.org.uk/content/technologies-sorting-end-life-textiles-0>



It exists, in the field of textile, footwear and household linen, a large number of practices and benchmarks. Meetings within the Materials Sorting Committee are the opportunity to link actors of the industry with one another, enabling thus to ease partnerships, and also to identify interesting and innovative solutions, to develop a common vision of customers' expectation, etc.

Call for Testing **MATERIALS SORTING**

The Materials Sorting Committee proposes the subjects for research and carries out a selection process for the submitted projects.

Specifications: the candidate demonstrates the phases required in materials sorting that are possible to implement from a technical aspect, in order to respond to a specific demand for recycled materials, derived from used clothing, household linens and shoes. This demand is expressed in quantities of material (tonnage needed per class of material for one or more chosen applications), observing the demand for a particular quality (norm, homogeneity, purity, etc.) at a recovery value established between the sorting operators and the buyers of materials and detailed production costs. Specific funding for materials sorting may be offered, depending on how sustained demand is and on economic, environmental and social factors.

The following information concerning projects must be submitted to Eco TLC and RDC Environment as a minimum requirement:

- **IN THE CASE OF SORTING OPERATORS:** description of the sorting process, any difficulties encountered, breakdown of the costs and itemisation of costs, sales prices for different amounts, difference in value between the remaining proportion and the proportion prior to materials sorting, assessment of potential volumes in the category of material being researched.
- **IN THE CASE OF RECYCLING FIRMS:** description of the technical process, any technical constraints, sales price for proportion obtained from recycling, minimum production capacity.
- **IN THE CASE OF SPINNING (for projects with recycled yarn):** description of the technical process, advantages and any technical constraints with the new category of sorted material identified during testing and considered for industrial development, sales price for recycled yarn and difference to the price for virgin yarn, recycled yarn derived from materials

other than clothing, shoes and household textiles, viability of incorporating the yarn derived from used clothing, shoes and household textiles into the production of new yarn, analysis of potential volume of recycled yarn, minimum production capacity required for industrial development.

- **IN THE CASE OF MARKETERS:** quality requirements, advantages and any technical constraints involving the new category of sorted material identified during testing and considered for industrial development, maximum purchase price and difference to the price for virgin products, analysis of potential volumes.

The overall results will be submitted to the Materials Sort Committee and to the Accreditation Advisory Committee as research projects in the context of the Materials Sort Committee are of general interest to the sector. Projects are open to any natural or legal person in the EU. Applicants may be firms which sort or recycle materials and components of used clothing, shoes and household textiles, processors of the above-mentioned materials and components or marketers of new products that incorporate the same materials and components.



Is your company interested in applying?

Download the application at: www.ecotlc.fr under "Innovation". Closing date for submission of applications: **31 August 2015.**

Please email any queries for further information or submit your application to:

- Jean-Luc Bartharès / Eco TLC: jl.barthares@ecotlc.fr
- Mélanie Coppens / RDC Environment: melanie.coppens@rdcenvironment.be

Call for projects **INNOVATIVE TEXTILES**

The "New Industrial France" announced by the French President on 12 September 2013 set up 34 industrial projects which roadmap has been adopted on 4th June 2014. Among these actions, a call for projects related to "New uses and process in textile" has been launched within the "Industrial projects for the Future" comprehensive plan.

The ambition of this call for projects dedicated to innovative textile is triple: **1/** to market new products meeting consumers expectations regarding new social challenges and new features by offering more technological and environmentally-friendlier textile; **2/** accelerate the modernization of industrial process, equipment and production tools within textile companies; **3/** develop these companies in France and to export.

On last May 18th the Ministry of Economy, Industry and Digital, Emmanuel Macron, has announced that the 34 initial plans would be grouped into 9 industrial solutions. The smart and technical textile plan is thus now linked with the "Connected objects" industrial solution. However, this evolution has no impact on the conditions of access to the CGI nor on the directions based on the 3 main priorities indicated in the call for projects of 20th February 2015. To date, several important projects related to biobased fibers, connected professional clothing and engineering consulting firm of the future, are on track.



The call for projects is open until 30 June 2015 on the website of the Banque Publique d'Investissement France [French Public Investment Bank]. It has a total budget of 20 million euros. Applications, for which the eligible amount is over three million euros, will be assessed in a priority review, the minimum base for work submitted being at least 1.5 million euros.



Emmanuelle BUTAUD
General Delegate of the
Union des Industries Textiles

REPORT

As head of the steering committee having established the call for projects for innovative textiles, the Union des Industries Textiles invites all companies in the sector to submit their projects. The deadline is 30 June and it will be a matter of first come, first served, so a prompt response is called for. Two projects were already announced to the press on 18 March but they do not involve recycling. We are therefore keen to receive proposals from Eco TLC's stakeholders. In particular, we encourage

small and medium-sized enterprises to join forces to increase their bargaining power, for example, a collector, sorter and a recycler. Should you have any questions, do not hesitate to contact the office for textiles, clothing and leather at the French Ministry of Economy (Ministère de l'Économie):

- Fabrice Leroy, Head of the office for textiles, fashion and luxury: Tél. +33 (0)1 79 84 38 84 - fabrice.leroy@finances.gouv.fr
- Annie Calisti, Responsible for the textile sector: Tél. +33 (0)1 79 84 33 72 - annie.calisti@finances.gouv.fr

