



Green Leather Industry for the Environment (greenLIFE) is a project run by a group of industry partners in Italy's Arzignano tanning cluster. The project partners have committed to sharing their findings by publishing a series of papers in *World Leather*. The final of six greenLIFE articles comes from the University of Padova, which was tasked with carrying out an analysis of the social and economic impacts of the new processes developed.

greenLIFE 6: The social and economic impacts of the new sustainable processes

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greenLIFE overview

The GreenLIFE project, which came to its conclusion in May 2017 after three years of research, set out to develop new oxidative liming and bath reuse, and new enzymatic liming and chrome-free tanning processes. In addition, the project partners aimed to improve the collection and reuse of hide and leather by-products in the industrial, agricultural and energy sectors.

In previous issues of *World Leather*, we have included articles from the five

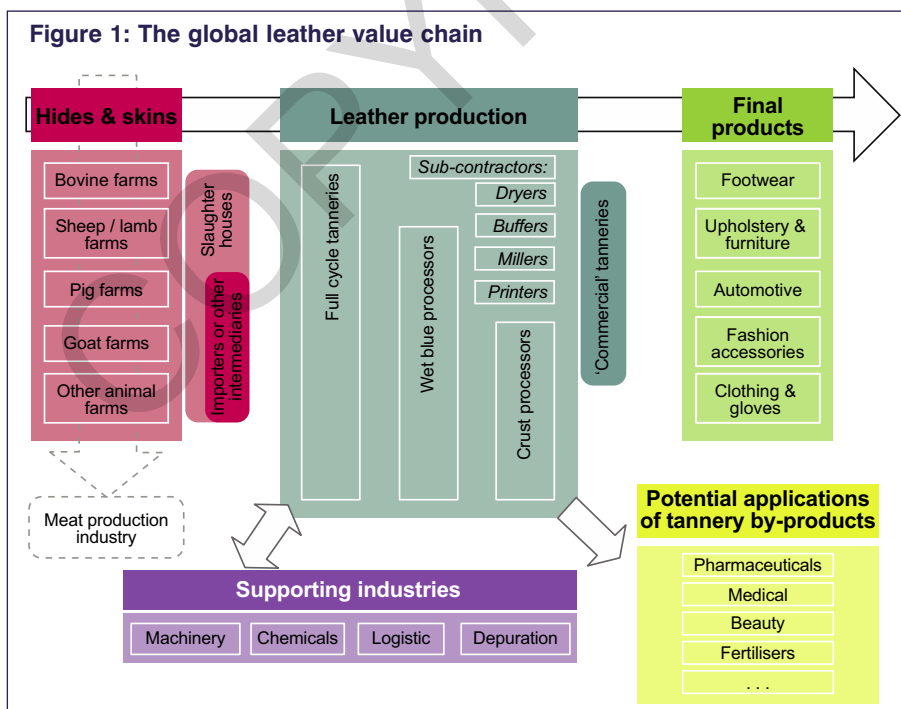
partners - tanners Gruppo Mastrotto and Gruppo Dani, chemical supplier Ikem, biotechnology firm Ilsa, and wastewater treatment service provider Acque del Chiampo – in which they explained the technical achievements related to the new technologies that have resulted from the greenLIFE project.

The final article in the series examines the social and economic impacts that the mainstream implementation of these technologies could have, as well as their environmental implications.

Introduction

In this article, we summarise the economic and social impacts that will apply to the partners of the greenLIFE project (those that participated in different stages of the research), companies in the local clusters, and other value chain participants (*Figure 1*). The information is based on in-depth interviews with key figures at the companies that participated in the project, as well as other industry stakeholders, including representatives from local institutions. Quantitative forecasts have also been carried out.

Figure 1: The global leather value chain



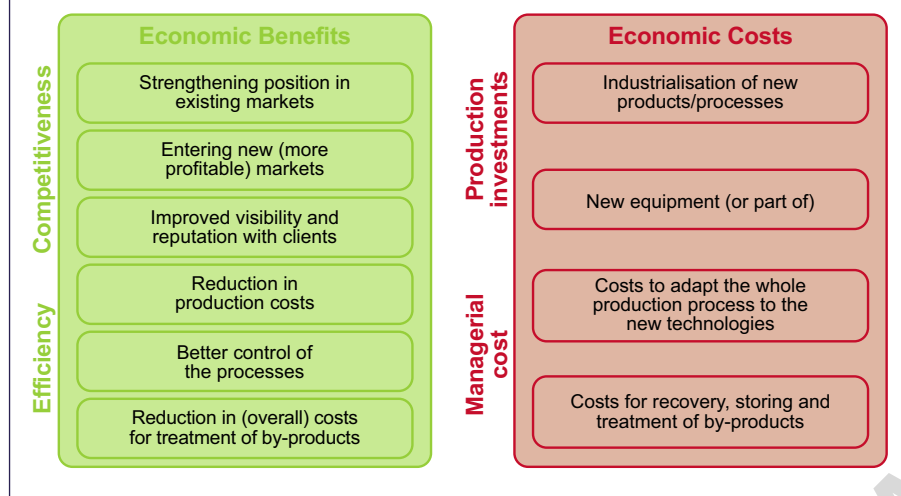
1. Competitiveness benefits for tanneries

Competitiveness benefits resulting from the application and development of the new technologies, which affect *in primis* the project partners, improve the ability of the companies to compete. Such elements cannot be quantified *a priori*, but have been described as the primary driver of interest in the new technologies. The reasons are as follows:

- The new technologies improve the product offered; the leather is more suitable for light-colour applications, easier to print on and has fewer wrinkles.
- Companies reported that the new applications support the strengthening of their market position in their existing markets and offer opportunities to enter new, and potentially



Figure 2: Overview of the economic impacts of the development and adoption of greenLIFE technologies by tanneries



more profitable, markets. Clients and consumers are increasingly demanding 'green' products and leather that releases considerably lower levels of emissions if burnt at end of life. The new technologies will be key to tanneries becoming or remaining preferential leather suppliers. It will also allow them to ask for a premium price for the leather they produce.

- The project represented an opportunity to improve the image of tanneries to clients (especially major buyers), which may now consider them to be capable partners for new product ranges.

2. Efficiency benefits for tanneries

The new technology will also result in a reduction in the cost of business-as-

usual practices for companies. This can be explained as follows:

- The new technologies will allow companies to save on input costs by reducing the amount of chemicals, water and energy needed to run the process. For example, the oxidative liming with recovery of liming baths could allow for a 2.7% reduction in the use of chemical reagents and an 18% reduction in water usage. Overall, this would represent an average reduction of around 0.31% in total costs on turnover. A 10.1% reduction in the use of electrical energy and a 10.4% reduction in methane used can also be added to these figures.
- There will be additional savings on depuration costs, which represent the largest sustainability-related expense

for tanneries. The liming process with recovery of by-products and liming baths, for example, could allow for a 0.67% reduction in total costs on turnover due to a 24.4% reduction in wastewater.

- Related to the previous point is the collection and reuse of by-products extracted from such waste elements, which have applications in a range of industries, including medicine, pharmaceuticals, cosmetics, haircare and textiles. Should tanneries in the Arzignano cluster adopt the liming process with recovery of by-products and liming baths technology developed by the greenLIFE project, the amount of hair that could be of use in other industries would range between 19,791.3 tonnes and 23,749.6 tonnes.

3. Investments and managerial costs for tanneries

In order to be able to use the new technologies on an industrial scale, tanneries have to invest in new drums and in modifying the layout of their production process, which might be fairly limited costs.

The most impactful costs are managerial costs, which are related to the introduction of the new production line. This includes investment in training for the new technologies as well as for the recovery, storage and treatment of by-products. In order to be cost effective, this must be a collective effort (i.e. involving several companies within a cluster).

4. Economic benefits along the global value chain

The new technology will provide economic benefits to companies along the leather value chain (Table 1) including:

- Companies manufacturing products from finished leather will benefit from the improved aesthetic quality of their final product. They will also have the possibility to advertise their usage of environmentally-friendly leather to their final market, giving them a chance to strengthen their position in the 'green market' niche. A reduction in the cost of disposing products at the end of life is of particular benefit to automotive companies.
- Input providers such as chemical producers, which through their support of the development of the

Table 1 - Overview of economic impacts for companies along the value chain

		Supporting industries			Final product manufacturers
		Chemical companies	Depuration companies	Waste treatment companies	
Economic benefits	Improved products				●
	Strengthening of market position	●			●
	Reduction of water costs		●		
	By-product related cost reductions		●	●	
	Reduced costs for end-of-life treatment				●
Economic costs	Investment in new equipment	●	●		
	Costs for recovery, storing and treatment of by-products			●	
	Drop in quality of product (for some applications)				●
	Reducing role of existing product	●			



Figure 3: An overview of the social impacts

• Less toxic product • Improved environmental awareness	Final consumers
• Improved quality of life • Reduced pollution • Reduction odours	Local community
• Increased local competitiveness • Improved working environment • Job enlargement and enrichment	Company's personnel

enzymatic liming process, are able to develop innovative methods that can be applied to the development of new, sustainable chemicals.

5. Social impacts

Besides economic impacts, the processes will also have social benefits (Figure 3).

- Company personnel, including both workers in the tanneries and workers in companies manufacturing products using finished leather, for whom the application of the new technologies will provide an improved working environment due to it being less dangerous (the new process does not emit hydrogen sulfide) and less smelly. Furthermore, the new technologies will provide opportunities for workers to improve their skills and expand their responsibilities.
- Local communities near to tannery production areas will also benefit from an improved quality of life due to the reduction in environmental emissions (both air and water). Together with the increased competitiveness of local companies, this could have a positive effect on the

local region by improving its reputation and its ability to attract talent.

- End users and customers, who are going to use the cars, accessories and upholstery made from the leather tanned using the new technologies, will benefit from a non-toxic product and the development of materials from a renewable source.

Conclusions

Besides environmental benefits, the diffusion of the technologies developed through the greenLIFE project could also have important economic and social impacts. These could affect not only the tanneries adopting the new processes, but also the other companies that form part of the leather value chain.

The economic and social benefits described in this article will only become fully effective when the new technologies are employed on an industrial scale. The more companies that adopt them, the lower the cost of implementation becomes. As a result, it will be important to ensure that the environmental, social and economic benefits of these new technologies are widely communicated, both to industry partners and other stakeholders, so as to allow them to have the highest possible impact. ©

[1] See the final project report for an explanation of the estimation techniques and the data sources used. Data reported are estimations performed using LCA data produced by project partners and industry data on average costs for tanneries, as reported by the Italian tanneries organisation (UNIC). All estimations are performed considering that the whole production is going to be realised using the new technologies.

[2] Considering fixed tariff costs and average depuration costs.

greenLIFE series comes to a close

With the completion of the series, a synopsis of the previous greenLIFE articles is given with the relevant *World Leather* publication date.

The first article in the series (*World Leather* December/January 2016) came courtesy of Arzignano-based tanner Gruppo Dani, one of the founders of the project. Its main focus was on the development of a new oxidative hair removal technique, which was one of the project's key aims. The article offered information about some of the technology used during this research and an explanation of the methods that had been employed.

Another of the project's founders, Gruppo Mastrotto, offered the second article in the series (*February/March* 2017), in which it focused on how a reduction in the usage of chemicals and clean water in the new liming process could help to make leather production more environmentally sustainable. It also explained the numeric index system that was used to quantitatively assess the effect of these modifications on the environmental impact of the process.

The third article in the series (*April/May* 2017) was supplied by chemical supplier Ikem, one of the greenLIFE project's partners. It described the research it carried out to develop a new organic tanning system derived from

renewable and readily available resources. This was achieved using a process that allowed by-products, such as polysaccharide, to be transformed into tanning agents. The article also gave a summary of the advantages of using this new product in the tanning process.

In article four (*June/July* 2017), another project partner, biotechnology firm Ilsa, explained the methods that can be used to convert some of the by-products from the tanning cycle, such as hair, into fertilisers for use in the agricultural sector. It also assessed the effectiveness of fertiliser products developed in this manner, offering insight into how they might compare to the commercial solutions that are currently available.

The penultimate article in the greenLIFE series (*August/September* 2017) gave details about a life-cycle assessment (LCA) carried out by wastewater treatment service provider Acque del Chiampo. It aimed to examine how the new technologies developed during the project would impact the effluent treatment plant in Arzignano, taking into account a range of characteristics including energy consumption, water usage and environmental emissions. It also offered a comparison with the region's current wastewater treatment operations.

All of the articles are available online in the *World Leather* technical library. ©