Green Deal Leather

Towards Zero Impact of the European Leather Industry

Project 101051445

STUDY

CARBON FOOTPRINT OF EUROPEAN BOVINE LEATHER

Funded by the European Union

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Foreword of the EU social partners

In 2021, the EU made climate neutrality - the goal of zero net emissions by 2050 - legally binding in the EU. It also set an interim target of 55% emission reduction by 2030 to keep global warming below 1.5°C, as called for in the Paris Agreement. The **European Green Deal** is a package of policy initiatives, which aims to set the EU on the path to a green transition allowing it to achieve these goals.

The **Green Deal Leather** project is a contribution of the EU social partners of the tanning sector towards this important goal. It is important that authentic and verified information on the environmental impacts of products are conveyed to consumers, and this includes the carbon footprint of leather and its downstream products. Factual and science-based information is required to dispel any myths conveyed in the public arena with an increase in negative campaigning against the European tanning industry which does not properly reflect the reality. The social partners stress that incorrect and damaging information harms the European tanning industry and threatens businesses, most of which are SMEs, as well as workers.

The present study reveals the **average carbon footprint of one square metre of European bovine leather** and presents the various elements of the tanning process leading to the identified impact. It indicates the hotspots and the most relevant life-cycle stages and discusses methodological options and modelling choices.

Increased transparency and factual information on the real carbon footprint of leather will hopefully have a positive impact on the European leather industry's image.

The study is also a tool that allows other bovine leather tanners in Europe and beyond to compare their carbon footprint with the EU average and helps them to transition to greener processes.

The tool that has been used for calculating the carbon footprint, ECO_2L, has been developed by the leather industry for the leather industry. It is based on CEN Standard EN 16887 and has the ambition to become the instrument to measure the CO_2 impact of tanning processes. This fosters in-house transparency and external comparability.

The EU social partners encourage all tanners to calculate their carbon footprint and to measure their individual progress in the green transition and their contribution towards the **goal of zero net GHG emissions in the EU**.

Gustavo Gonzalez-Quijano	*Judith Kirton-Darling*
Secretary General	General Secretary
COTANCE	IndustriAll Europe

Introduction

Leather making is a very old craft. In the past it was banished to the edge of villages because it smelled and wasn't nice to look at. Tanners were never able to completely get rid of this image, but at the same time, this was precisely why they got involved in environmental issues very early on as investments were made in wastewater, energy saving, use of by-products, reduction of waste and efficient use of chemicals.

However, leather manufacturers had little influence in an area which, on the other hand, had an enormous influence on production – and unfortunately that is still the case today - their **raw materials**. The animals from which hides and skins are processed in a tannery are raised to provide people with meat and milk. Hides or skins have always been - and still remain - livestock by-products, not receiving the same attention as the livestock's determining products, milk and meat.

As tanners committed to **environmental protection**, competition soon arose between them. Since no tannery is the same, comparisons were mostly biased and rarely objective and fair. For example, if a tannery starts with tanned goods (wet blue or wet white), it uses less energy than a tannery that starts with processing raw hides, even if both tanneries offer the same finished leather. The same applies to many other factors in the production process that influence energy consumption (own energy production, waste avoidance, own sewage treatment plant, leather thickness, etc.). For an accurate comparison, such differences in processes must be corrected.

Already more than 15 years ago, as part of their association's commitment, a group of pragmatic tanners therefore created **a practical tool** which, as a first step, allowed energy consumption comparison between different tanneries.

The main goal of these comparisons between different tanneries and thus the motivation behind the creation of the **ECO$_2$L** tool was, in addition to providing information for customers and consumers, to obtain concrete data and information about where their own company stood in terms of **energy efficiency and CO_2 emissions**, and where deficits could be improved, even in different types of production. All CO_2 data are measured as CO_2 e (CO_2 equivalent).

These initial efforts were mainly based on the *Industrial Emissions Directive 2010/75/EU* and the *Energy Efficiency Directive 2012/27/EU*. The principle was: only energy-efficient production can also be environmentally friendly and sustainable.

The non-profit nature of this association guaranteed a **necessary neutrality** and enabled the tanners' experience to be used. A tool (ECO$_2$L) was created to allow the calculation of a company's specific product-related energy consumption using **verifiable company data** that could be compared to a standard (BEET - Best Energy Efficiency for Tanneries). This tool can now be used to collect a wide range of company data across the industry, not only on the energy efficiency of production, but also on the CO_2 emissions, water and waste volumes associated with this production.

What is the Best Energy Efficiency for Tannery (BEET)? How is it calculated?

BEET is a standard that specifies how much energy can be consumed for a certain amount of product using a certain working method/technology in order to receive the ECO_2L label. It is a decision-making hurdle that is intended to encourage effort. A standard tannery (Fig. 1) is the basis of reference. When auditing a tannery, correction factors are used to take into account any deviations from the reference value.

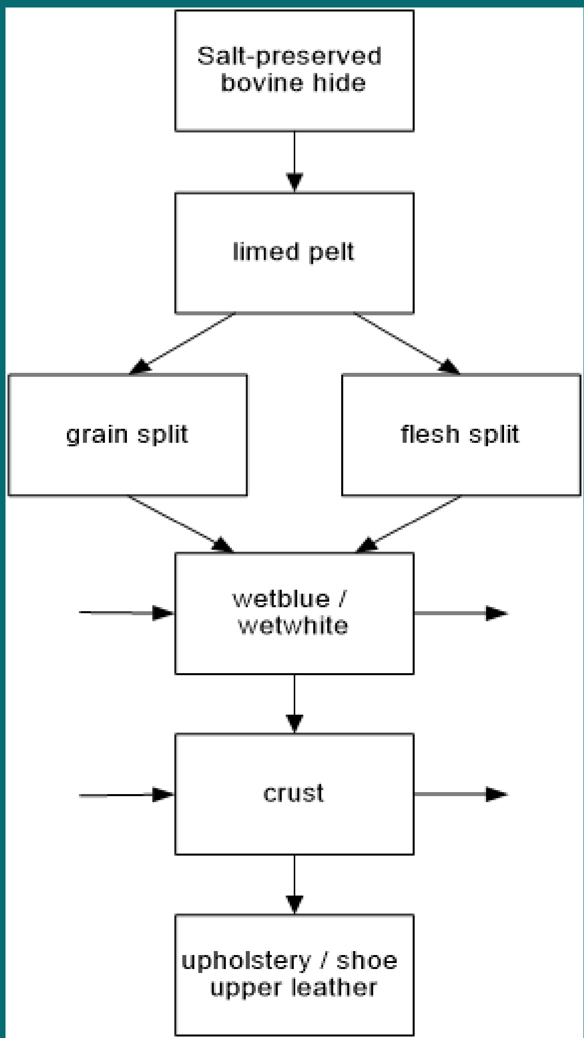


Fig. 1 Representation of a standard tannery

After determining the energy values, the second step was to determine the CO_2 emissions. Thanks to the ECO_2L tool, all CO_2 emissions associated with leather production, starting with the removal of the hide or skin, through transport to the tannery, production and transport of chemical agents to the tannery, including any pre-production, waste recycling and wastewater treatment for tanneries, are reproducible and comparable on the basis of the *EN 16887:2017 (Leather - Environmental footprint - Product Category Rules (PCR) -* CO_2 *footprints*). Even CO_2 emissions from the transport of packaging and technical aids are included.

With the adoption of ECO_2L 2.0 in the Green Deal Leather project, it became possible to use available 2023 data for evaluating bovine leather production emissions and compare them with those of European tanneries that were specifically audited for this project.

Study

1. Setting the scene

In order to be able to make the most realistic statement possible about the CO_2 footprint of finished cattle leather for the comparison in the Green Deal Leather study, we had to concentrate on the data from six European tanneries with a leather production of 10.2 million m² (only tanneries of categories E1 and F2, see Fig.2). This corresponds to the leather production volume of a medium-sized European country.

As part of this study, we also collected data from three European tanneries with a combined leather production of 2.7 million m² (only Cat. F1; see Fig.2) that had not yet been audited (audited and peer-reviewed in ECO_2L). Larger data collection for this study was not possible due to financial and time limitations.

Data from a total of nine tanneries from five EU member states (Germany, the Netherlands, Poland, Spain, Italy) were used for this study. Production can be divided as follows:

- Shoe upper leather: 22%
- Leathergoods leather: 23%
- Automotive leather: 49%
- Furniture leather: 4%
- Clothing leather: 2%

The data for the entire production was always considered.

> *Note: In practice, a hair-preserving liming, for example, has advantages for one production and not in another. This is often not due to the production step, but rather to the associated effects on wastewater, energy consumption, waste disposal, etc.*

The CO_2 determination included Scopes 1, 2 and 3, including the upstream and downstream processes.

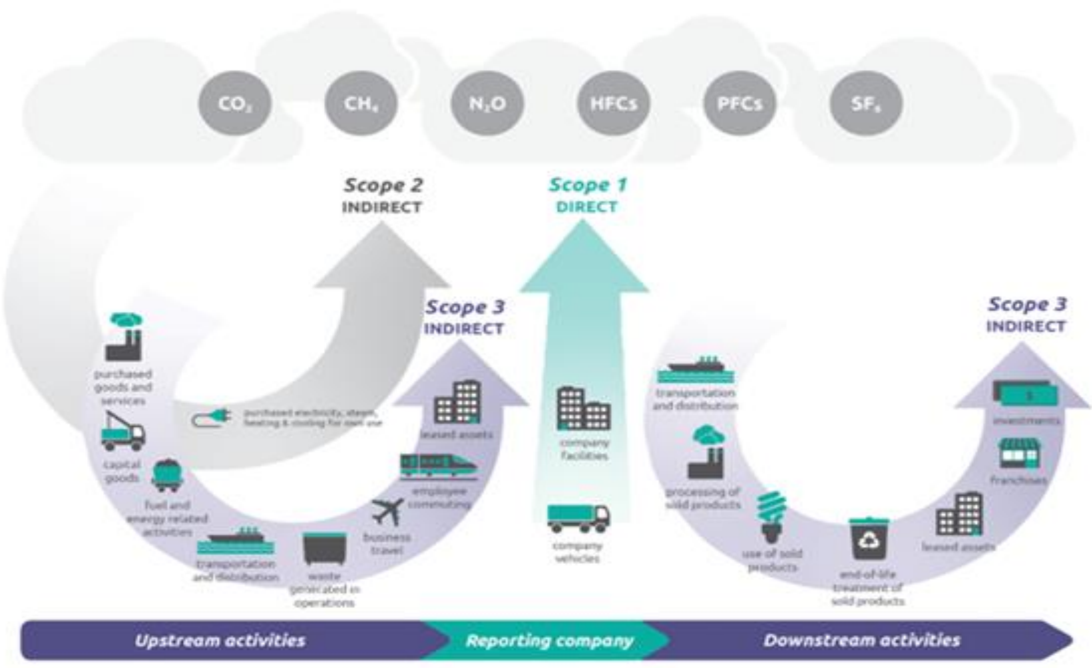
Determining the data for Scopes 1 to 3, allows driving production to be efficient and keeps the footprint small, regardless of which type of leather is produced. This achieves the goal of making production as efficient as possible, and as quick and easy as possible, regardless of the products manufactured.

> *Note: The Scope 3 area in a tannery is believed to contain a proportion of approximately 70-90% of all CO_2 amounts. These areas are to be narrowed down, calculated and allocated, particularly taking into account the Greenhouse Gas Protocol.*

The production of vegetable-tanned leather often has a worse CO_2 footprint than simply chrome-tanned leather. This is due, among other things, to the higher organic contamination of the wastewater and therefore to the higher effort involved in wastewater treatment.

As part of this GDL project, the data collection template was reviewed and taken over by the project partners. The data collection template can be downloaded here: data collection form/preparatory tool: https://www.eco2l-leather.com//wp-content/uploads/2023/12/ECO2L-8.5.14-Data-Input-Preparation-04-2023-ID-44601.xlsx.

Overview of GHG Protocol scopes and emissions across the value chain



Source: WRI/WBCSD Corporate Value Chain (Scope 3) Accounting and Reporting Standard (PDF), page 5.

Scopes 1 to 3

The scope concept derives from project management and refers to all the processes and resources required to complete a project. According to the GHG Protocol, this categorisation is essentially intended to distinguish between the sources of direct and indirect emissions and to ensure that two or more companies do not record emissions in the same scope.

Scope 1:

Emissions from sources for which companies are responsible or in control of. These include emissions from:

- Energy sources at the company's location, such as natural gas and fuels, coolants, etc.

-The company's own fleet (e.g. cars, vans, trucks, forklifts, etc.).

Scope 2:

This includes indirect greenhouse gas emissions from purchased energy, such as electricity, steam, district heating or cooling, which are generated outside the company's own system boundaries but are consumed within these boundaries.

Scope 3:

Indirect emissions within the value chain:

This includes all indirect emissions that arise along the value chain of companies. Scope 3 emissions are defined as "the result of activities from facilities that are not owned or controlled by the company, but which directly influence the company within its own value chain."

Even if companies do not influence these emissions, they can be assumed to account for the largest share of companies' greenhouse gas emissions.

A distinction is made between:

Upstream emissions, which include the indirect greenhouse gas emissions within a company's value chain that are associated with purchased goods (tangible goods) and services (intangible goods).

Downstream emissions, which are the indirect greenhouse gas emissions within a company's value chain that are related to the goods and services it sells and that occur only after they leave the company's ownership or control.

Examples include the CO_2 emissions that arise when raw materials are mined, or proportionally the emissions of airlines used for business trips. Emissions that arise when the goods produced are used also fall into this category.

All data was generally collected by the tanneries themselves. In an audit, this data was then checked by an approved auditor and entered into the tool. This ensures proper and complete data collection. In a peer review by FILK, the data was checked again for plausibility, thus guaranteeing the quality of the company data collected as the basis for the present evaluation.

2. Categorisation of tanneries, system boundaries and correction factors

Categorisation of tanneries

The aim was to determine the energy efficiency and CO_2 footprint of leather production depending on the product mix produced by the tanneries examined.

Operations	**Sold products**	category	only one audited tannery	raw hide to tanned	tanned to crust	crust to finished leather	
only tanning	only tanned	A		OWN	POST	POST	only results for tanned leather, no results for crust and finished
only retanning	only crust	B		PRE	OWN	POST	only results for crust, no results for finished leather possible
tanning and retanning	only crust	C1		OWN	OWN	POST	only results for crust, no results for finished leather possible
tanning and retanning	mixed - tanned and crust	C2		OWN	OWN	POST	only results for mixed production, no results for single steps or finished leather possible
only finishing	only finished leather	D		PRE	PRE	OWN	only results for finished leather, no results for single steps possible
retanning and finishing	only finished leather	E1		PRE	OWN	OWN	only results for finished leather, no results for single steps possible
retanning and finishing	mixed - crust and finished leather	E2		PRE	OWN	OWN	only results for mixed production, no results for single steps or finished leather possible
"full-tanner", tanning, retanning	only finished leather	F1		OWN	OWN	OWN	only results for finished leather, no results for single steps possible
"full-tanner", tanning, retanning and finishing	mixed - tanned, crust, finished leather	F2	x	OWN	OWN	OWN	only results for mixed production, no results for single steps or finished leather possible
special case trader, no production		**G**	**not possible**	**PRE**	**PRE**	**PRE**	**not included in ECO2-L**

Fig. 2: Categorisation of leather production in ECO_2L 2.0

According to the ECO_2L 2.0 tool, **the tanning process is divided into the following three stages**:

1. Rawhide to tanned – from rawhide to tanned leather (wet blue/wet white)
2. Tanned to crust – from tanned leather to retanned, dried leather (crust)
3. Crust to finish – from retanned, dried leather to dyed, finished leather

Based on the overview (Fig. 2), it becomes clear how varied tanneries can be, and this only shows the differences in pure production processes.

The columns ‘raw hide to tanned’, ‘tanned to crust’, ‘crust to finished leather’ indicate which of the three stages the tannery carries out:

OWN - own production

PRE - external pre-production by suppliers

POST - external post-production by customers

The categorisation is crucial for comparability and transparency as it clearly highlights the influence of pre-production.

This study collected data from tanneries that can be assigned to the following categories: 3 Cat. E1, 3 Cat. F1 and 3 Cat. F2. Measured in terms of production, the percentages are 35% Cat. E1, 21% Cat. F1 and 44% Cat. F2.

System boundaries

The product category rules of EN 16887:2017 clearly define the general system boundaries, from the acceptance of the hides at the slaughterhouse to the tannery exit gate.

This CEN Standard describes itself as having "cradle to gate" system boundaries. It considers that the start of the lifecycle of leather begins at the moment in which the hide or skin of meat-producing animals is separated from the carcass, thus gaining its identity as a by-product. Animal by-products and animal waste are very close concepts: they are not produced on purpose and they exit the ecosystem in which they occur (food/feed/others). By-products that are not recovered and valorised irremediably become waste. The EU Animal by-products Regulation (*Regulation (EC) No 1069/2009*) is an exception to the application of EU waste rules (*Directive 2008/98/EC*). Transforming such hides and skins can be assimilated to a "recycling" (or upcycling) activity that avoids them becoming waste. Consequently, hides and skins of meat-producing animals were given a 0-allocation.

Brester Swanser report on elasticity in hide prices

In 2021, Dr. Gary W. Brester and Kole Swanser, Ph.D. published a research study titled 'Quantifying the relationship between US cattle hide prices/value and US cattle production', concluding that cattle hide prices do not directly affect cattle production and have only a small, indirect effect. They estimated that, if, for example, hide prices rally and increase by, say, 10%, that annual US cattle production would increase by 0.17%. Consequently, increases in hide prices indirectly increase US cattle production, but by an insignificant amount.

Co-Author and Professor Emeritus at Montana State University, Dr. Gary Brester, evidences that cattle are not produced for their hides. He says: "The cattle industry invests huge resources to improve beef quality and production, but they don't invest in improving hide production. This is because hides are simply a by-product of cattle production. However, while people don't raise cattle for the purpose of producing hides, cattle hides have value and input into many products including clothing, furniture, automobile interiors, and sporting goods. As a result, the value of cattle is somewhat influenced by the value of hides."

When asked whether a decrease in the value of hides would lead to all hides being wasted, he answered: "There is a cost to processing, transporting, and using hides. If processing plants cannot profitably sell hides, then they would be disposed of in some manner. Even now, many smaller cattle processing plants dispose of hides in landfills or incinerate them because the value of the hides does not cover the costs of processing them. If every plant in the US was a very small plant, they would probably dispose of all hides rather than process them into useful consumer products."

The system of calculation

In the case of a tannery that, for example, does not work from raw hides but rather purchases input materials that have already been tanned, an energy consumption or CO_2 emission value must be determined for that pre-production. The purchased, incorporated wet blue has an energy consumption or CO_2 emission value that corresponds either to the actual value (if this specific data is available from a corresponding ECO_2L data set; primary data) or an average standard value (if in the specific case there is no data from an ECO_2L audit; secondary data).

> *Note: The information to be provided by the audited company for the calculations with the tool must qualitatively correspond to the provisions of EN 16887. That means:*
>
> *- that all data presented must be provable and verifiable;*
>
> *- that location-specific primary data must preferably be used;*
>
> *- that in the event that primary data cannot be presented, this must be justified and documented in the auditor's report.*
>
> *Only in the latter case may secondary data be used, which must also meet the qualitative requirements of EN 16887. The source of the secondary data must be clearly documented in the auditor's protocol.*

Correction factors

To picture the various production conditions in a tannery in a comparable way, the actual production values were recorded in the original ECO_2L tool on the one hand and a BEET comparison value was calculated on the other hand. This BEET (Best Efficiency Energy Tanning) comparison value builds on the diagram of a standard tannery (see Fig. 1) and the BAT notes (Best Available Technologies). The deviations of the audited tannery from the standard tannery are compensated for using statistical correction factors.

For example, it makes a difference whether:

- a tannery only uses salted or fresh hides, or both. This changes the water consumption, the processing time and the utilisation of the tanning drums.

- in a tannery the hides are split or all hides are worked to their full substance. This influences, for instance, process times and chemicals consumed.

- a tannery produces leather of different thicknesses. This changes the amount of chemicals used, the energy required to dry leather, and therefore also the CO_2 emissions.

Thanks to the correction factors and the BEET, it is possible to compare different production methods using the BEET comparison value, even for varying inhouse production depths.

Note: The correction factors were determined by the "Working Group ECO_2L". The Benchmark BEET is designed as standard for the production of shoe upper leather or upholstery leather from salt-preserved cattle hides. This also implies splitting the hides after liming and fleshing, as well as further processing of the non-crouponed lower split until, at least, after tanning (i.e. wet blue/wet white condition or later).

The correction factors do not modify the actual tannery values, they are used to determine the internal comparison value BEET, which is used as a measure for achieving the ECO_2L label.

3. Further methodological considerations

We deliberately did not take into account the influence of cattle (breeding). We do not dispute the relevance of agriculture, but we wanted to focus on the factors that can be influenced by the tannery. This is in conformity with EN 16887, which addresses the part of the leather supply chain that starts from the moment of flaying at the slaughterhouse to the exit gate in the tannery.

Note: The impact of agriculture, regardless of who calculates it and how it is calculated and distributed, is so great that tannery emissions would appear negligible compared to it.

Everyone is free to supplement the technically correct and verifiably determined emission values of the ECO_2L 2.0 tool with values from agriculture (lifetime of the animal) and from the use phase of the leather in the form of a consumer item.

This study compares the CO_2 footprints of very different leather productions in tanneries. Since generally the same production system applies to all tanneries processing cattle hides, collected production data can be compared, using the deviations from the BEET. This is possible even if differences in the product mix are properly taken into account.

In Europe, tanneries that only make shoe upper leather in one thickness, one colour and one finish are very rare. Europe's competitiveness relies on its know-how to produce requested lots of highly customised quality leathers in the short run. Achieving a competitive CO_2 footprint under such circumstances constitutes a considerable challenge.

A tannery can do little to change the product mix produced, as this depends on the market and customers. However, it can try and produce as efficiently as possible and it may want to check whether there are opportunities for improvement in waste recycling, energy use, chemical use, etc.

When calculating the CO_2 emission values, not only the core production process of the respective company is taken into account, but also:

- the production and transport of chemicals
- the water supply
- the delivery of the raw materials or preliminary products to the tannery
- the delivery of packaging material and technical aids
- that of pre-production
- that of wastewater treatment
- waste recycling and disposal

Since it can be difficult, especially with chemical agents (in particular mixtures), to obtain corresponding energy consumption and CO_2 emission values from the manufacturer or supplier, secondary data are available in the ECO_2L 2.0 tool for these cases. These are provided by TEGEWA.

Note: Data sets of tanning chemicals from TEGEWA members (Association of Manufacturers of Process and Performance Chemicals for textiles and tanning) are made available exclusively for the Association of the German Leather Industry. Data was compiled for the first time in 2018. They are updated regularly, the last time in 2021.

*Note: Further information on how the ECO_2L tool works is described in the guidelines, to be found at **www.ECO2L-Leather.com***

The ECO_2L 2.0 tool is based on the product category rules of EN 16887. This means that the requirements regarding definitions and terminology, system boundaries, allocation rules, cut-off limits and data quality also correspond to this standard.

All audits carried out so far are constantly expanding the available database. As the internally used comparison value BEET improves, the requirements steadily increase with improvements in production.

4. Results of the Green Deal Leather study

The evaluation focuses on minimum, maximum and average values for six European tanneries which produce a total of approx. 10.2 million m2 of finished leather, whose values are confirmed according to ECO$_2$L 2.0.

The evaluation showed an average value of CO_2 emissions for the product mix of approx. 8 kg CO_2 e/m^2 (see Fig. 3).

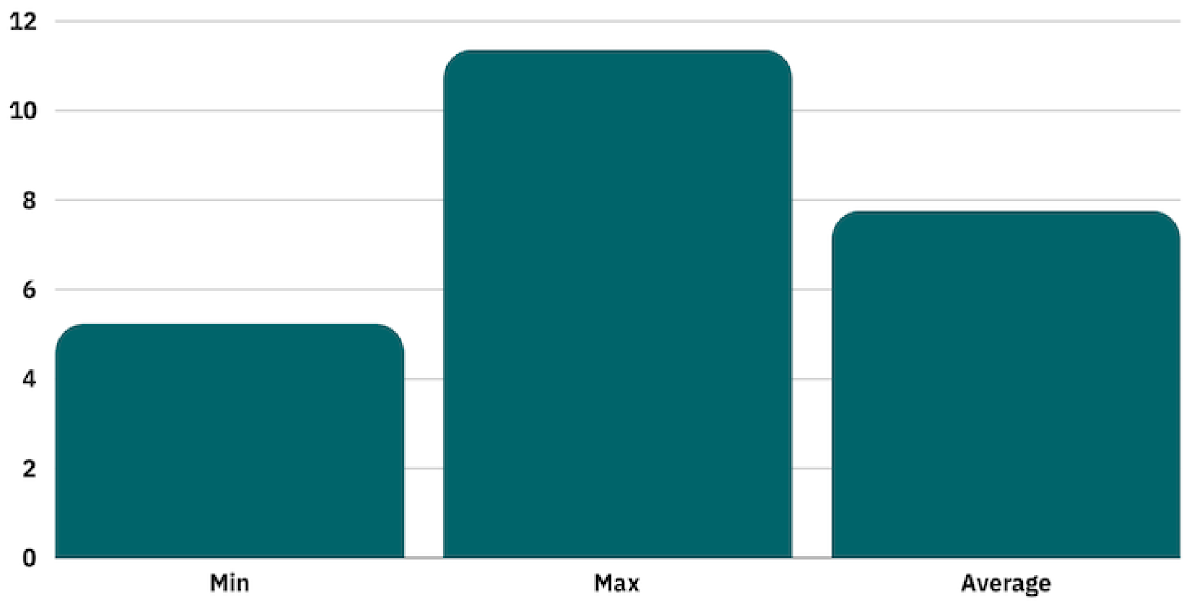


Fig. 3: audited tanneries of Cat. E1-F2 in 2022 overall values

Note: The results of the study do not show good and bad values, but rather the values of effective tanneries that produce different product mixes, i.e. different items with different requirements. This reveals in particular the variations in the use of chemicals in terms of type and quantity.

A closer look at the values obtained, indicates the clear influence of CO_2 emissions from chemical production (almost 60%) on the CO_2 emissions of the entire leather production chain (see Fig. 4). Anyone wanting to change the CO_2 footprint of leather must address the chemicals used. Using a tool like ECO_2L allows one to raise awareness of the level of chemicals consumed in a tannery and how its impact can be changed over the years.

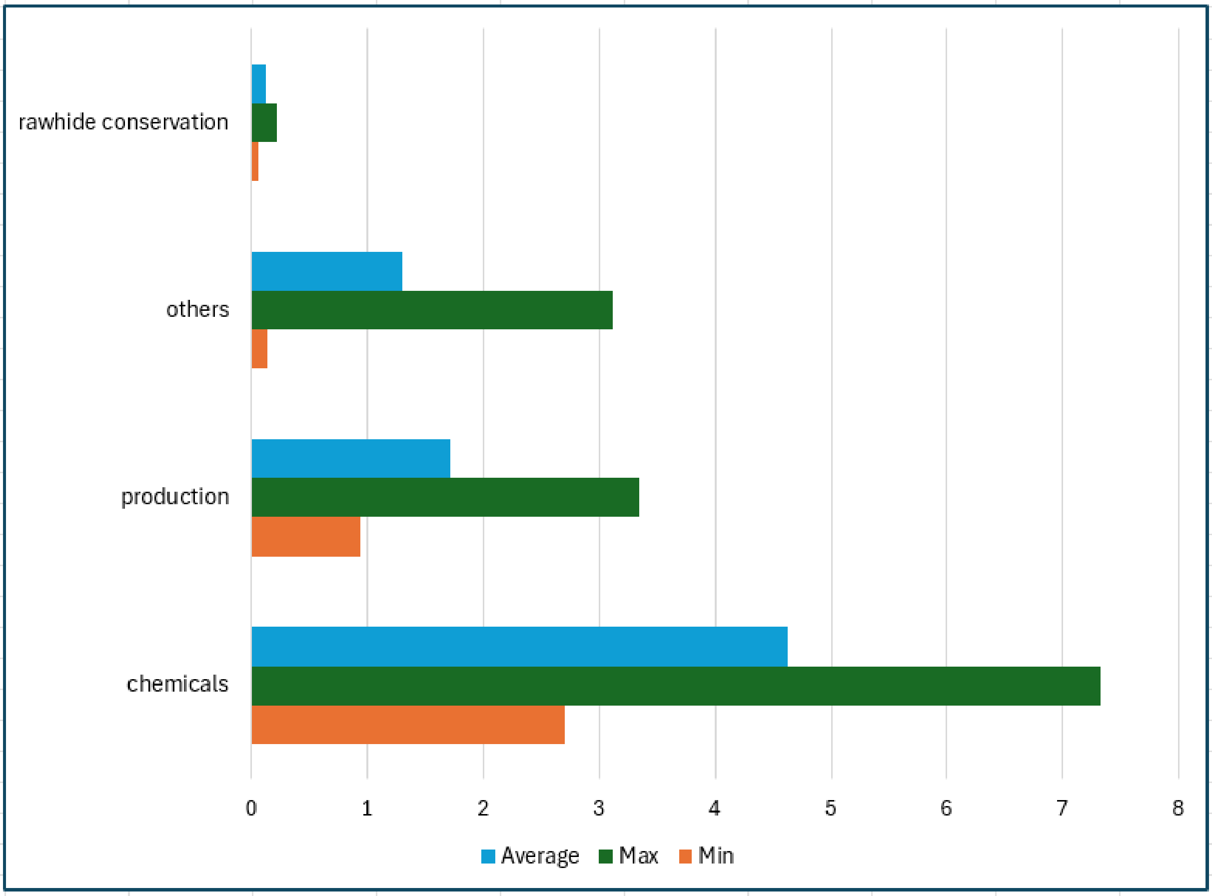


Fig. 4: Sources of CO_2 emissions in leather production in 2022

Breaking down the data further reveals the importance of the remaining impact factors beyond the CO_2 emissions from chemical production. In second place are the CO_2 emissions associated with production, and thus the emissions that a company can directly influence. With the help of the tool, sources of CO_2 emissions can be identified and controlled and, eventually, reduced.

Note: Wordings of the following graphics are explained in the Annexe.

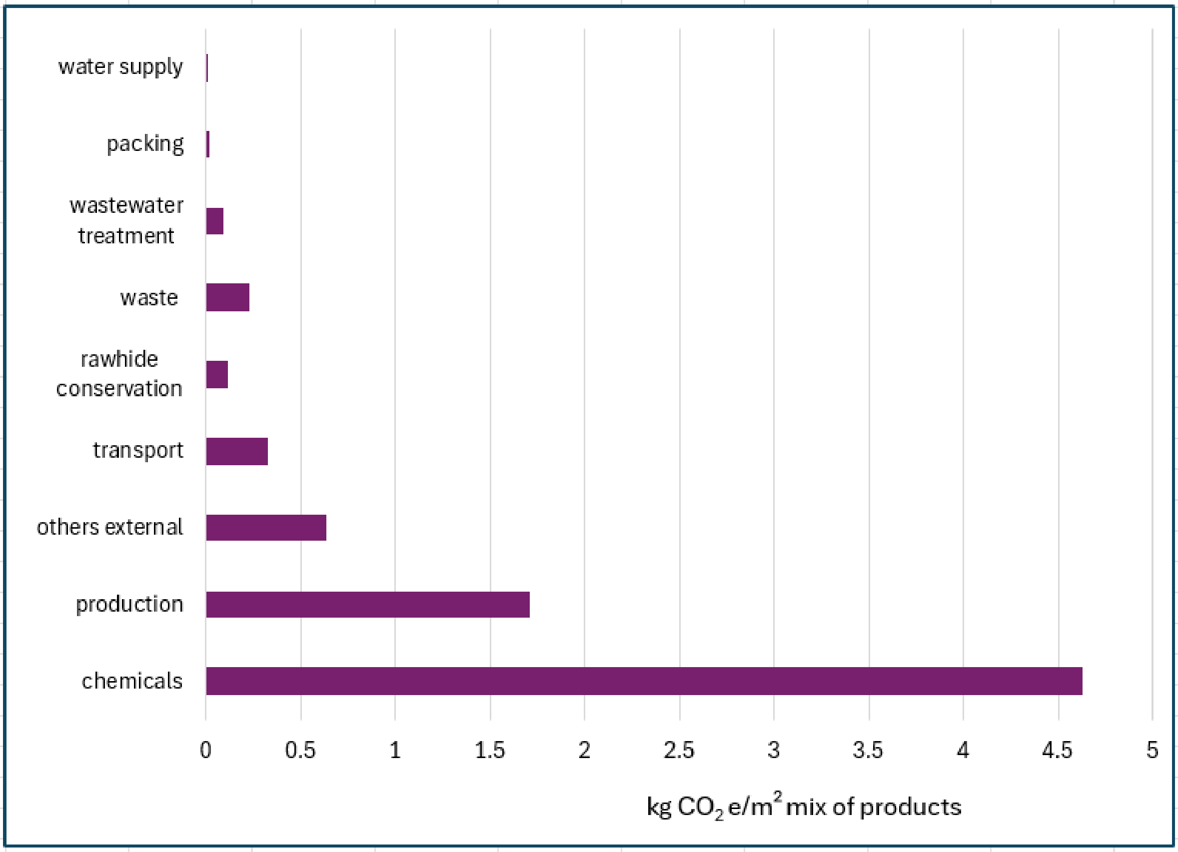


Fig. 5: Average values of the areas of origin of the CO_2 emissions (database 2022)

If you look at the minimum and maximum values of individual impact factors in relation to their average value (Fig. 6), you can see that the company has significant savings potential: for example, in terms of CO_2 emissions from waste recycling and disposal. Even if the average value of CO_2 emissions from the waste recycling and disposal of the tanneries examined in the study is only around 3% of the total emissions, the range between the minimum value and the maximum value is approx. 0.25 to approx. 2.25 kg CO_2 e/m² product mix. This means that there are companies that essentially achieve an environmental advantage through clever handling of their waste, while other tanneries can still greatly avoid CO_2 emissions in the area of waste disposal.

Another impact factor to indicate is rawhide preservation; where the difference between minimum and maximum values is not that significant in relation to the average value of the data evaluated in this study. This means that the differences between individual companies are smaller.

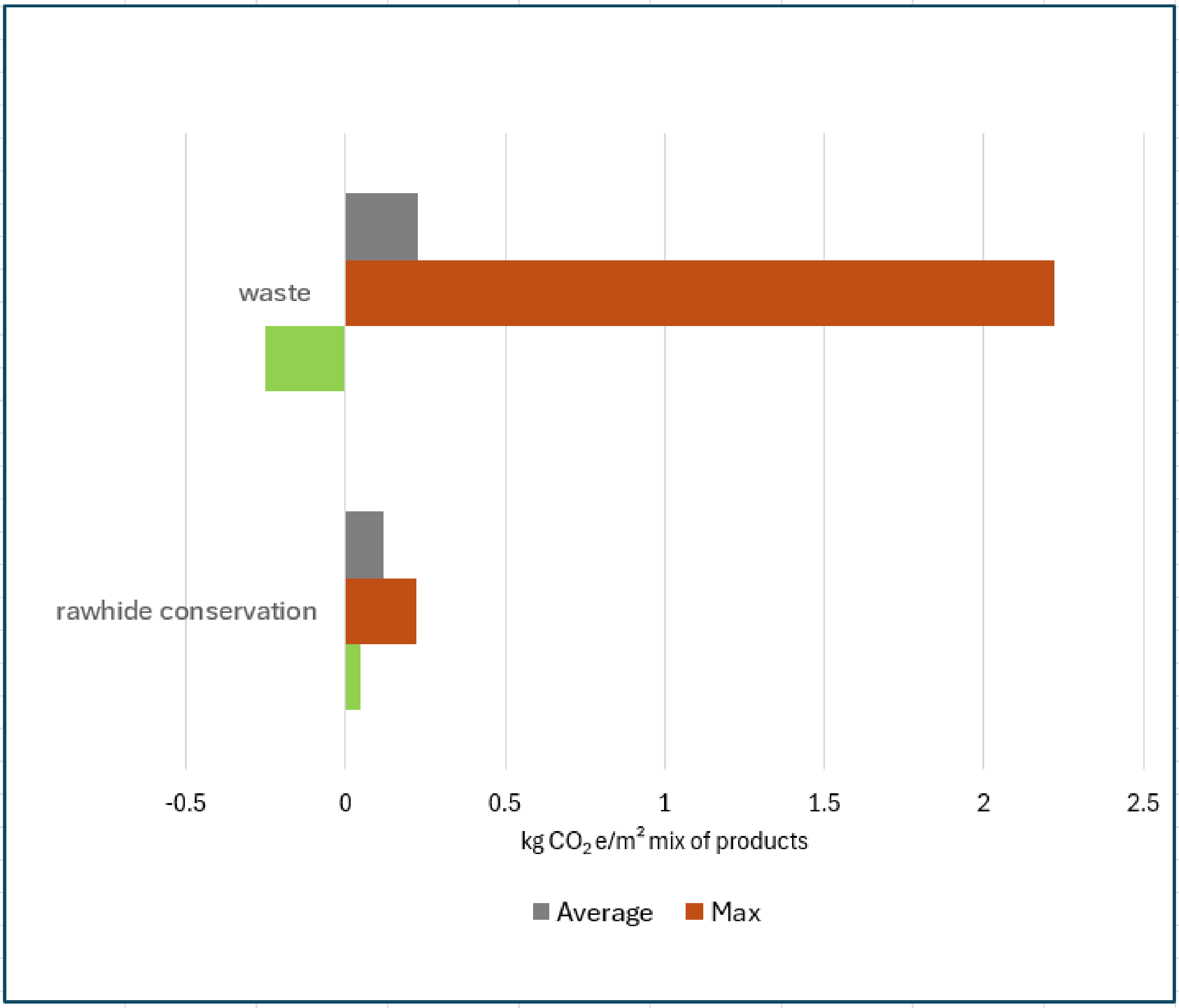


Fig. 6: Ratio between minimum and maximum values compared to the average value for selected areas of influence (database 2022)

Figure 7 hereunder provides an overview of all the data collected for the Green Deal Leather study.

When looking at the values shown for chemicals and production, it is noticeable that they are divided into “external” and “tannery” (Fig. 5). This results from the fact that some of the tanneries included in the study use tanned goods as raw materials and work up to finished leather (categories E1 and F2 in Fig. 2). The CO_2 emissions from external pre-production and the external use of chemicals to produce the tanned goods at the supplier appear there.

It is also noticeable that the minimum value of external production and chemicals can be zero. This is obviously due to tanneries without external production (i.e. their own production from raw materials to finished leather or categories E1 and F2 in Fig.2).

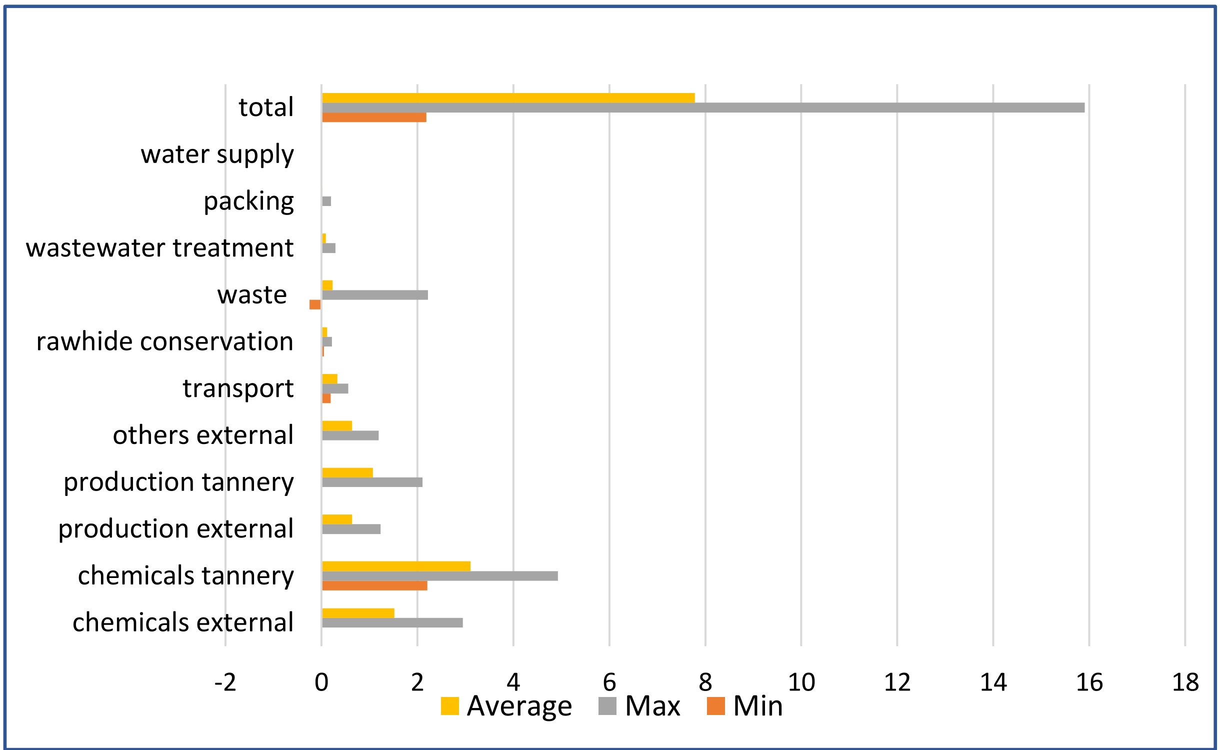


Fig. 7: Different CO_2 emissions of a tannery and its influence on the total CO_2 footprint of the produced leather (Database 2022, Europe)

Other external CO_2 emissions only arise when certain services are used or external work is carried out, e.g. material purchased for the processing of waste.

Extreme differences between the minimum and maximum values arise primarily from the large differences between the tanneries' productions. Tanneries, service providers (contract tanners) in particular normally have only a limited influence on the chemicals used. The use of certain chemicals also depends heavily on the product/type of leather being manufactured (shoe upper leather, upholstery leather, automobile leather).

When supplying energy for self-production, the associated CO_2 emissions can fluctuate greatly depending on the local energy supply. For example, if biogas or district heating is available, there are lower CO_2 emissions than when fossil fuels are used as an energy source.

When it comes to waste recycling and disposal, the associated CO_2 emissions depend heavily on the possible regional recycling routes, legal requirements and market conditions, and can vary greatly in different countries. Due to numerous restrictions, tanneries cannot always deliberately influence the final disposal route.

This is where the importance of the correction factors of ECO_2L 2.0 become evident. The correction factors are intended to compensate for differences between different productions and make them comparable. However, the correction factors only affect the comparability of energy consumption.

In conclusion, the CO_2 emissions of a European bovine tannery are around 8 kg CO_2 e/m2 of finished leather. The largest share of these CO_2 emissions for leather production results from the production of the necessary chemical agents. It is therefore very welcome that chemical suppliers contribute to the reduction of the CO_2 emissions associated with the production of their mixtures. However, the use of chemicals and thus the resulting CO_2 emissions depend very much on the type of leather to be produced.

The newly audited tanneries – results

The three European tanneries that took part in an evaluation of their datasets as part of the GDL project show clear differences in the values achieved. Tanneries that use the ECO_2L tool for the first time immediately identify where there is room for improvement and adapt their production. It becomes more effective, meaning less energy is needed per m² of leather produced, reducing thus the tannery's CO_2 footprint.

Due to the internal rules (entry hurdles) for achieving the BEET, data from one tannery was not taken into account.

If one compares the results of the tanneries that have already been audited several times with those that were audited for the first time, one can see where savings can be made.

New audits ECO_2L	kg CO_2e/m^2 mix of products				new tanneries	
spec	Min	Max	Avg	%	Avg	%
chemicals	2.7	7.3	4.6	59.7	8.1	66.2
production	0.9	3.3	1.7	22.0	2.7	22.3
others	0.1	3.1	1.3	16.8	1.2	10.1
rawhide conservation	0.1	0.2	0.1	1.5	0.2	1.3
Total	3.8	14.0	7.8	100.0	12.3	100.0
Tannery Total	**5.2**	**11.4**	**7.8**		**12.3**	

Fig. 8: Comparison in general of the "old" ECO_2L-audited tanneries and the "new audited" tanneries (data from 2022 and 2023)

When comparing the newly audited tanneries with the "old" tanneries, one can see that there is still room for improvement in the areas of chemicals used, production, wastewater and packaging. This corresponds to previous findings.

New audits ECO_2L	kg CO_2e/m^2 mix of products				new tanneries	
spec	Min	Max	Avg	%	Avg	%
chemicals external	0.0	3.0	1.5	19.5	1.7	14.0
chemicals tannery	2.2	4.9	3.1	40.0	6.4	52.2
production external	0.0	1.2	0.6	8.2	0.7	5.8
production tannery	0.0	2.1	1.1	13.8	2.0	16.6
others external	0.0	1.2	0.6	8.2	0.6	4.8
transport	0.2	0.6	0.3	4.2	0.2	2.0
rawhide conservation	0.1	0.2	0.1	1.5	0.2	1.3
waste	-0.3	2.2	0.2	3.0	-0.1	-1.1
wastewater treatment	0.0	0.3	0.1	1.2	0.3	2.3
packing	0.0	0.2	0.0	0.3	0.3	2.1
water supply	0.0	0.0	0.0	0.1	0.0	0.1
Total	2.2	15.9	7.8	100.0	0.0	100.0
Tannery Total	**5.2**	**11.4**	**7.8**		**12.3**	

Fig. 9: Comparison of the "old" and "new audited" tanneries in all parts of the production (data from 2022 and 2023)

Note: The new audits were processed according to the rules of the ECO_2L tool, i.e. by recording the data in the preparation tool completed by the tannery, undertaking an on-site audit in which an independent, neutral auditor checked the data and entered it into the tool, finally followed by the peer review to countercheck plausibility.

Conclusions

This study provides **insights into the carbon footprint of European bovine leather**. It is the first time that such an assessment has been carried out on a sample of European tanneries, making it possible to provide a reference figure for the CO_2 impact of one m^2 of bovine leather.

However, the carbon footprint of leather gives insights into only **one environmental impact category**. It serves as a measure to estimate the effects on climate change. Other aspects, such as ozone depletion, eutrophication, ecotoxicity or land use, are considered equally relevant by tanneries and are not ignored when it comes to ensuring the overall sustainability of processes and products.

The study also provides **information on the efficient use of energy**. The tanners who build up the tool always kept in mind that evidence should be given that resources were used efficiently. The use of CO_2-reduced or neutral energy does not mean that a tannery might use energy in an above average quantity.

The study shows that European tanners are **highly committed to environmental protection**. This is remarkable because their good results are not based on leveraging large-scale production of a standard leather, as can be seen in many places in the world, but on the competent use of resources in the production of a variety of different leathers with different colours, thicknesses and performance characteristics in relatively small lots.

But the study also shows that you need **reliable, verifiable values** that can be compared if you want to make a broad variation of products and production facilities comparable. This is possible for leather.

Wherever they have the opportunity, European tanners want to act and take action. We see their **potential influence** on improving energy efficiency, reducing CO_2 emissions, on minimising the use of water and chemicals - or in other terms: constant commitment to making leather production even more efficient and sustainable.

Annexe: Glossary related to graphics

Chemicals, external	The total expenditure incurred by the use of chemicals in production at the suppliers of semi-finished products (e.g. wet blue supplier). Includes the total expenditure incurred by the use of chemicals in secondary processes (wastewater treatment, recycling of chemicals, water treatment, etc.) at the suppliers of semi-finished products
Chemicals, tannery	The total expenditure resulting from the use of chemicals in the production of the audited tannery. Includes the total expenditure resulting from the use of chemicals in secondary processes (wastewater treatment, recycling of chemicals, water treatment, etc.) in the audited tannery.
Production, external	The total energy consumption in production at the suppliers of semi-finished products (e.g. wet blue tanners).
Production (audited tannery)	The total energy consumption in the production of the audited tannery.
Others	All transportation of chemicals, packaging, raw materials, etc., by truck, rail, ship, and plane; all waste and by-products (including their transportation to the recycler/disposal company, including internal waste treatment); production of all packaging; wastewater treatment (internal and external).
Transportation	All transport of chemicals, packaging, raw materials, etc., by truck, rail, ship, and plane.

Rawhide conservation	Expenditure related to the preservation of raw materials, i.e. salting, cooling, including the production of preserving salts, sieving out loose salt if necessary.
Waste	Total waste and by-products (including their transportation to the recycler/disposal company), including internal waste treatment.
Wastewater treatment	Wastewater treatment expenditures (including internal and external, so that direct dischargers - tanneries with their own sewage treatment plant - and indirect dischargers – tanneries which have to use municipal sewage treatment plants, or others, can be compared).
Packaging	Production of all packaging materials, such as films, pallets, cardboard, etc.
Water Supply	Expenditure for water supply (pumps, pre-cleaning, etc.)

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