ECO_2L-Guidelines

Version 8.5.13 / 20 March 2023
www.eco2l-leather.com

Contents

I. Foreword

The ECO_2L (Energy Controlled Leather) label is owned by the German Leather Federation (VDL). The basis is a calculation tool which was developed by the ECO_2L Working Group and which continues to be improved. An audit is always carried out on-site by an approved auditor. In preparation for the audit, the tannery collects data in advance using the "preparation tool" and the guidelines. The data collected in this way is entered into the tool by the auditor according to the specifications of the ECO_2L Guidebook. The plausibility of the data and the conformity of the entries with the Guidebook are checked by FILK Freiberg Institute gGmbH (peer review). If the results of the audit meet the requirements of the ECO_2L Guidebook, VDL issues a certificate. The aim of this effort is to determine the energy consumption and CO_2 footprint of a tannery in a comparable way.

The decisive factor for the award of the new ECO_2L 2.0 label remains the company's energy efficiency compared to the BEET energy benchmark. The principle is:

A product with a good environmental footprint can only be sustainable if it has been produced in an energy-efficient way.

- Requirements and procedure

The requirements for awarding the new ECO_2L certificate to a tannery are:
- Calculation of the actual specific energy consumption of the company at the site.
- Calculation of the site-specific, international standard "Best Energy Efficiency for Tanning" (BEET) for the production type and quantity used = BEET comparison value.
- Calculation of the percentage deviation of the actual specific energy consumption of the company from the BEET by means of the BEET comparison value.
- The BEET comparison value must not be exceeded by more than 20%.
- Determination of the product carbon footprint (PCF) based on the product mix of the audited tannery.

To prepare for the audit, the company must download the ECO_2L preparation tool from the website www.eco2l-leather.com. The preparation tool is structured exactly like the actual calculation tool, which is however only available to the auditor. With the preparation tool, the company to be audited can see all the information requested in the audit and already enter it before the audit. All fields with a yellow background are to be filled in with data. Assistance in filling out the preparation tool is described in the guidelines.

The calculations are carried out on the basis of the data provided by the company and after verification by the appointed auditor using the calculation program ECO_2L. A check of the data for plausibility and correctness according to the specifications of the Guidebook or the calculation in the tool takes place by FILK after the audit.

The ECO_2L certificate is awarded by VDL if the results of the calculations correspond to the specifications of the Guidebook. The energy consumption and the product carbon footprint are certified for the manufactured product mix.

Certification includes the right to use the ECO_2L certificate for three – from 2024 for two – years in advertising for the audited location and the proven product mix.

- Aim of the tool and the certification

The aim of the ECO_2L 2.0 calculation program is to determine the product carbon footprint (PCF) for the tannery's product mix within defined system limits and in accordance with the product category rules (PEFCR) laid down in DIN EN 16887. By means of this process, the CO_2 emissions or the CO_2 emission equivalents are determined in a comparable way as the PCF for leather production.

In addition, the actual specific energy consumption of the company at the site must be calculated within defined system limits and compared with the BEET (Best Energy Efficiency for Tanning) energy benchmark for the respective leather production. If the BEET benchmark (comparative value) is achieved, the tannery can document its energy-efficient production with the ECO_2L 2.0 certificate.

- Basic standard

ECO_2L 2.0 always determines the BEET and the PCF of the audited company on the basis of the data of the twelve months immediately preceding the audit, specifically no more than three months before the audit. Example: the audit takes place in May 2023, so the period March 2022 to February 2023 is to be selected. Older data is not possible, more recent data is. The measurement period for the production data, the associated chemical, energy and water consumption and all other company data must be identical.

DIN EN 16887 is a European standard and is mostly used in the EU. However, as there is no comparable international standard to date, the specifications of this standard were chosen as the basis for the ECO_2L 2.0 tool.

The information to be submitted by the company to be audited for the calculations with the tool must therefore qualitatively comply with the provisions of DIN EN 16887. This means:

- that all data presented must be measurable and verifiable,
- that site-specific primary data must preferably be used and
- that in the event that no primary data can be presented, this must be justified and documented in the auditor's report.

Only in the latter case may secondary data be used, which, however, must also fulfil the qualitative requirements of DIN EN 16887. The source of the secondary data must be clearly documented in the auditor's report.

All collected sum data of the company (e.g. summation of all raw material transports or sum of chemicals used) must represent at least 99% of the population. This is to be verified by the auditor.

Companies seeking the ECO_2L certificate strive to achieve good energy efficiency and to reduce their carbon footprint and may wish to prepare for such an audit in advance. Advising in advance by the auditor conducting the audit is therefore not permitted.

II. ECO_2L organisational structure

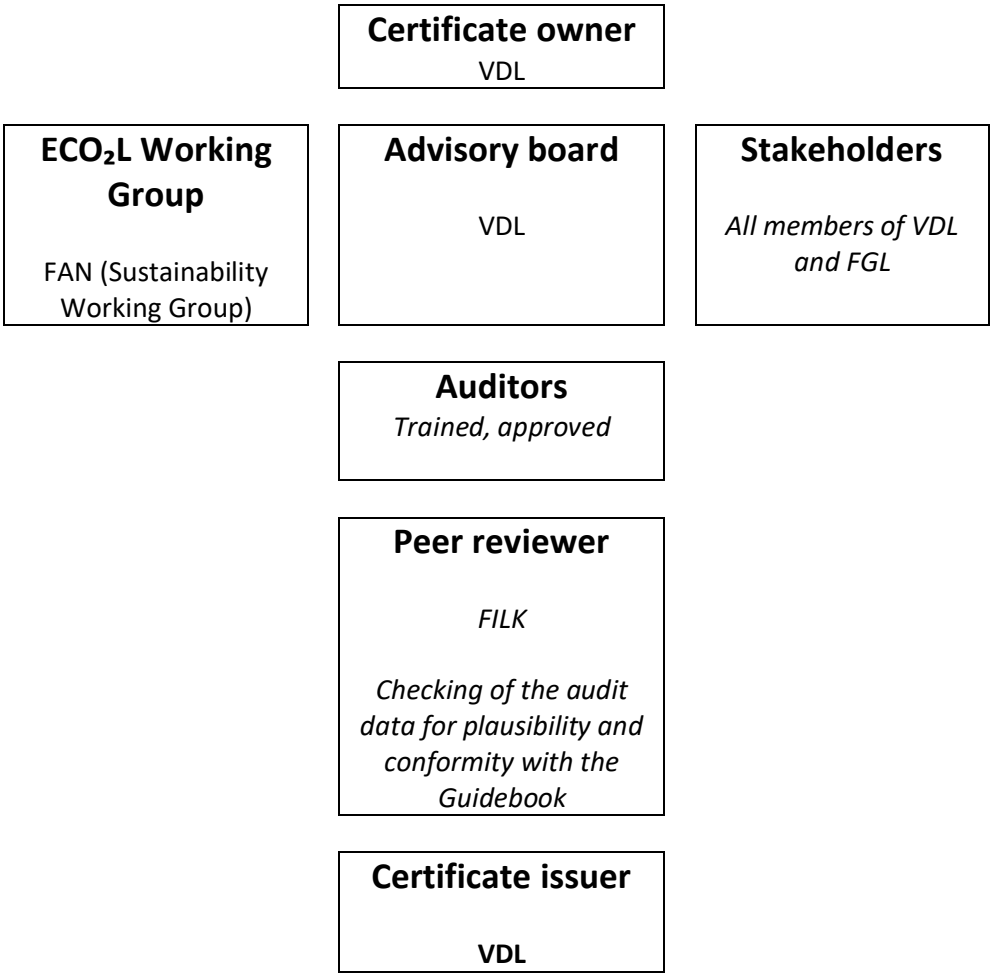

Figure 1

III. Audit schedule – from order to certificate

A. ECO2L-Audit schedule – from order to certificate

1. Order

a) Customer - Download and open the order form from the website www.eco2l-leather.com. Complete the order/application form in electronic form. Print out and sign manually.
   - Who is ordering (name, address, VAT number or VAT ID for EU).
   - For which location (name, address, VAT number or VAT ID for EU) the order is placed.
   - Who the respective contact persons for invoicing and technical audit are (name, email address, telephone number).

b) Specific information: Are there certain details to be provided on the invoice so that the company can pay the invoice in advance? Customer, who is doing the order: Send order to FILK (as scan or original).

2. Invoice part 1

a) FILK sends invoice to ordering company.

b) FILK sends the privacy policy and consent to use the data with the invoice.

c) Orderer pays in advance and sends signed data protection declaration to FILK.

3. Assignment of auditor / Preparation of audit / Invoice part 2

Once the invoice has been paid and the data protection declaration signed, FILK commissions the auditor.

a) Appointment
The appointment for the audit is made between the company and the auditor directly. FILK is to be notified by email of the agreed date and time.

b) Filling out the preparation tool.

c) The preparation tool must be downloaded anew from the website www.eco2l-leather.com before each audit so that it always corresponds to the current version.

d) The preparation tool is completed by the client.

e) The guidelines (also on the website) can be of assistance.

f) The client shall ensure that the completed preparation tool is sent (by email) to the appointed auditor **at least two weeks before the audit so that the auditor has time to review the information and clarify questions before the audit. This is the only way to keep audit costs low.**

4. Audit

a) The auditor transfers the data from the preparation tool to the ECO_2L tool and the auditor checks the data for the first time. Any questions that arise are sent to the company.

b) Carrying out the audit on-site (online) – verifying the data from the preparation tool together with the client.
c) The documents are then sent electronically by the auditor to FILK for peer review.

B. Privacy policy

All data provided by the ordering party (client) / auditee to VDL, FILK and to the appointed/commissioned auditor in the context of the ECO_2L audit will be treated confidentially. The auditee/orderer (client) agrees that their data will only be used to fill in the ECO_2L tool, in the context of the further development of the tool as well as in aggregated form for general statements in connection with the ECO_2L tool.

- When transferring the data, it must be ensured that only previously agreed email addresses are used. The completed preparation tool is sent by the client to the appointed auditor. The appointed auditor transmits all data to FILK for peer review. After completion of the peer review, all data is sent to VDL. The data is only used and stored for the purposes stated in this section.
- The email addresses are transmitted by FILK to the customer with the sending of the invoice.

C. Data basis

The prerequisite for carrying out an audit is verifiable data, which must be entered into the preparation tool (download from the website).

ECO_2L always determines the BEET and CCF of the audited company on the basis of the data of the last twelve months immediately preceding the audit. The interval between the most recent data and the audit may not exceed three months.

The recording period for the production data, the associated chemical, energy and water consumption and all other company data must be identical. All data must be verifiable by the auditor. Only clearly comprehensible, professionally measured data or data that can be substantiated by means of evidence and records form the basis of the audit. Estimates are only acceptable if they are of minor importance for the result and if they have been clearly explained or derived in an understandable way in the notes.

Transport of raw materials, chemicals and waste	Distance in kilometres from the distribution centre for each supplier, shipping and/or receiving address using for example: SeaRates (www.searates.com) / Google Maps (www.google.com/maps)
Water consumption, wastewater volumes	Meter readings
Energy consumption	Invoices, meter readings
Waste quantities	Weighing slips, invoices, proof of disposal
Produced leather surface	Measurement reports, delivery notes, invoices
Chemical consumption	Purchase invoices, consumption logs

Table 1: Examples of types of primary data and their evidence

It is consumption data that is recorded and not inventory data. It is also not about input/output. What is decisive is the actual production quantity in each area. So from raw material to tanned, from tanned

to crust and from crust to finished leather. Every company should have production statistics. With this approach, leftovers, buffers or stocks have no influence. A stock correction is therefore not necessary.

Note: The effort generated by reworking is included, but the quantity of reworked leathers must not be included. The auditor must take special cases into account by explaining them in an understandable way in the notes in the tool or on an extra sheet. All consumption data must relate exactly to this produced quantity.

For this reason, input equals output. If you take 100 hides into production (input, regardless of whether they are from the stock of current production or purchased), then 100 hides must also come out (output, regardless of whether they go into sales or into the warehouse). One hundred hides were produced. The input and output are not needed for the calculation. The auditor must make sure that these calculations are correct and plausible for the produced quantities, i.e. that they match the capacities of the plants.

Stock and time shifts are not relevant.

If company-specific consumption data on chemical, water, wastewater, energy, waste or production quantities cannot be proven, the certification lacks a basis, and the audit must be cancelled. The certificate cannot be issued.

IV. Components of the audit

A. The calculation tool

In the calculation tool

- The fields in which entries can be made are mainly highlighted in yellow (strong yellow).
- Fields with a green background (lighter green) are fields in which standard entries are already given but which can be changed by the auditor
  - if the tannery can plausibly present other data
  - or the auditor considers the entry of other data to be useful. In these cases, however, the change of data must be explained in the “Remarks” section of the respective worksheet.

for all calculations:	
data input	modifiable
standard values - overwrite if verifiable values available	modifiable
given standard value	not modifiable
hidden value - unpublished	not modifiable
automatically calculated or transferred	not modifiable
data only as additional information and/or for double checking, not relevant for calculation / audit result	not modifiable
headline only for information	not modifiable

Table 2: Meaning of the colours in the tool

B. Specifications (worksheet content)

The process of tanning is divided into 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.

The columns K, L and M indicate which of the three stages the tannery performs:

OWN	own production
PRE	external pre-production by suppliers
POST	external post-production by customers

Table 3

In columns G/H of the table, select the products sold by the tannery: “Sold products”.

In column J, an “x” is to be entered in the corresponding row according to the three stages carried out in the tannery and the products sold.

This has an impact on the corresponding evaluation sheets 5.5.1 to 5.6.2.

After entering only one “x” in column J, the text under the column “Please tick only one” disappears, otherwise the text remains.

1. Chemical production (worksheet 1.1)

This worksheet calculates the total annual amount of CO_2 equivalents emitted using the chemicals to be recorded. The mass-based CO_2 equivalent of a chemical auxiliary includes the emissions for its production as well as the transport of the basic chemicals to the place of production of the auxiliary and from the place of production to the central distribution warehouse of the auxiliary producer.

The consumption quantities of all chemical auxiliaries are to be recorded and indicated separately for the period under consideration according to the area of application:

- Production step rawhide to wet blue / wet white (rawhide–WB/WW).
- Production step wet blue / wet white to crust (WB/WW–crust).
- Production step crust to finished leather (crust finish).
- For wastewater treatment and other applications (wastewater treatment plant (WWTP), others).

All auxiliary materials used must be assigned to an EC group. The assignment of the different chemicals to the areas of application, which is given row by row in the tool, is arbitrary and may differ from company to company.

In the event that chemical auxiliaries are used that cannot be assigned to an EC group, these should be added in the additional rows:

- For these chemical auxiliaries, a written confirmation of the mass CO_2 equivalent should be provided by the supplier.
- Independently of this, CO_2 equivalents per kg can be used for each chemical used by the audited tannery.

Credits for use of waste products. If a quantity of chemicals is actually consumed through the use of substances in production that would otherwise have had to be disposed of, the quantity can be used as a minus quantity. A negative CO_2 value is to be regarded as avoided disposal and therefore credited. As different possibilities are defined here by each company itself, there is no blanket statement here. A justification/explanation and proof of disposal or proof of recycling for these chemicals are to be attached in the Remarks (e.g. sodium aluminate / aluminium processing or sodium hydrosulphide).

In contrast, the ECO_2L audit distinguishes between material recycling (cement aggregate) and energy recycling (substitute fuel) for the tannery's waste disposal. If energy recovery takes place (e.g. shavings are incinerated to generate heat), the tannery receives a credit. In the case of material recycling (shavings go into leather fibre material), the quantities are valued at zero. (See also chapter D. 2. Waste).

2. Water supply (worksheet 1.2)

In this worksheet, the total annual amount of CO_2 equivalents emitted by the use of fresh water to be recorded is calculated. The main source of CO_2 emissions is considered to be the electrical power generation needed to transport the fresh water.

The consumption quantities of fresh water for the period under consideration are to be recorded and indicated.

If water is purchased from external sources (e.g. drinking water network), either the default value for energy consumption of 0.555 kWh/m3 can be used (G10) or a written confirmation from the supplier on the energy consumption of the purchased water is provided (G11).

In the case of in-house water extraction from a well or surface water (if no separate meter is available), the CO_2 equivalent of the in-house electrical energy can be calculated by calculating the electrical energy demand. The calculation is made, for example, by determining the performance characteristics of the pumps (and possibly other energy consumers) used for water extraction, maximum flow rates and daily or weekly running times of the energy consumers.

Calculation basis (only as an example for sheet 1.2 field G12):				
Electrical power pump	Input value	22.00	kW	Must be known (type plate)
Pump delivery rate	Input value	56.00	m^3/h	Must be known (type plate)
Pump running time	Input value	3,650	h/a	Operating hours counter
m^3 total	Calculated value	204,400	m^3/a	For cross-check with field F12 – should be about the same value!)
Total energy consumption pump	Calculated value	80,300	kWh/a	
kWh/m^3	Calculated value	0.393	kWh/m^3	Enter in field G12

Table 4

3. Upstream transports (worksheet 1.3)

In this worksheet, the total annual quantity of CO_2 equivalents emitted by the use of the transport of chemicals, packaging and raw materials to be recorded for each means of transport is calculated. These items are to be listed and named individually so that they can be compared in terms of quantity with worksheet 1.1.

Worksheet 1.3 contains six tables presented one after the other for recording the transports:

- of chemical auxiliaries and packaging material (Tables 1.3.1–1.3.3) and
- of raw materials (Tables 1.3.4–1.3.6).

In the case of packaging material, only packaging material procured for packaging semi-finished or finished products is to be recorded, not packaging material in which raw materials or chemicals were packaged.

The transports are recorded separately by means of transport, as each means of transport has a different CO_2 emission per transported tonne and kilometre.

The means of transport are:

- HGV (Tables 1.3.1 and 1.3.4),
- ship and rail (Tables 1.3.2 and 1.3.5) and
- aircraft (Tables 1.3.3 and 1.3.6).

The transports that took place for the materials consumed in production during the recording period are to be recorded. This means that the transports may have taken place before the recording period and the procured materials may have been stored until they were used in production.

According to the product category rules of DIN EN 16887, the transport of rawhides from the slaughterhouse to the leather factory must be considered. If rawhides are not supplied directly from the slaughterhouse to the tannery, but from the collection point of a hide trader (preserved or refrigerated goods), only this transport distance is relevant in the recording of the tannery, as a determination and assessment of the CO_2 equivalents of the upstream process

of rawhide preservation is carried out in worksheet 2.3 of the ECO_2L 2.0 calculation tool and the transport emissions from the slaughterhouse to the hide trader are already included there.

Here, the company must submit detailed breakdowns with exact distance information in order to calculate the transport emissions as CO_2 equivalents on this basis. For the calculation of the distance in kilometres, the website www.searates.com or Google Maps (https://maps.google.com) can be used, for example.

4. Packaging material (worksheet 1.4)

This worksheet calculates the total annual amount of CO_2 equivalents emitted during the transport of chemicals, packaging and raw materials to be recorded for each means of transport. The mass CO_2 equivalent of a packaging material includes the emissions for its production as well as the transport of the raw materials to the place of production of the packaging material and from the place of production to the central distribution warehouse of the packaging material manufacturer.

The consumption quantities of all packaging materials are to be recorded for the period under consideration. Only packaging material procured for packaging semi-finished or finished products should be recorded, not packaging material in which raw materials or chemicals were packed. The auditor should make the secondary calculations that lead to the entries in worksheet 1.4. below in the free rows so that the context/calculation remains comprehensible.

Explanations should be entered in columns H–I (Remarks) if the packaging material used in the tannery deviates from the specifications in columns A–C. For general cargo such as pallets, the specifications refer to the average weights of the general cargo to facilitate the determination of the total weight of the respective packaging material. The wooden horse has already been entered in the Remarks as a note. If other packaging materials are used than those provided for in the table so far, these are to be added in the rows highlighted in yellow in the table. Upon request, the auditor shall be provided with proof of the purchase quantities in the form of delivery notes and invoices.

The information in this table only refers to the production of the packaging. The transport of the packaging is calculated separately in worksheet 1.3 Upstream Transportation.

5. Energy use (worksheet 1.5)

This worksheet calculates the total annual amount of CO_2 equivalents emitted through the use of the energy used in production. The energy is broken down into the individual energy sources.

Energy consumption for upstream and downstream processes such as the
- in-house or external water abstraction (worksheet 1.2) and
- wastewater treatment (worksheet 3.1),
- in-house or external waste processing (worksheet 3.2) and for

- chemical, packaging material or raw material procurement (worksheet 1.3)

is included in the respective items of the ECO_2L 2.0 tool and are also evaluated there regarding their CO_2 emissions. Therefore, energy used in these fields is not to be recorded as production consumption.

The energy input for production, together with the leather surface produced, is a decisive criterion for comparison with the BEET benchmark (see definition for benchmark calculation). Therefore, only the energy consumption of the core processes will be considered here.

The consumption quantities of all energy sources for the production

- including administration, laboratory,
- including technical services,
- excluding in-house upstream or downstream processes such as cold storage for raw materials, wastewater treatment, chrome precipitation, fat extraction or folding chip hydrolysis

shall be recorded and reported for the period under consideration.

The value of CO_2 emissions for the electricity mix valid for the respective continent is to be used for electrical energy.

Note
If so-called green energy is purchased, i.e. electricity that is produced (almost) without CO_2 pollution (e.g. produced from wind, solar, hydropower, biogas) – and the tannery must provide evidence of this – values of up to zero can also be entered here.

The conversion factor between energy input in kWh and CO_2 equivalent in kg CO_2/kWh from the table of cells K42 to K46 valid for the respective region shall be used, unless the tannery can plausibly prove another conversion factor.

If energy sources other than those defined and listed in the table are used, they shall be named in the **rows "Others"**. The energy factor per unit in MJ/unit (entries in cells H36 and H37) and the CO_2 emissions per unit (entries in cells K36 and K37) must be verified. This verification also applies to the use of externally generated steam under "External steam supply (10 bar)" (entry in cell K29).

The **density of LPG** was assumed to be 0.512 kg/l in the table. If a different density is verified, the corresponding value of the energy per unit (in MJ/unit) must be converted and entered in column I. This also applies to deviating verified values of other energy carriers. The entries are to be explained in the Remarks section.

If a company has **only one global electricity or gas meter** for the entire tannery, this could be a reason for aborting the audit. Explanations of the tannery in this regard must be plausible and will only be accepted in the case of comprehensible calculations or very simple production.

C. Production

Basic information on the production data

Consumption data is recorded. Not inventory data.
It is not about the inflow (input) / outflow (output). What is decisive is the actual production quantity in each area:
- from raw to tanned,
- from tanned to crust and
- from crust to finished leather.

Every company should have production statistics. With this approach, leftovers, buffers or stocks have no influence. A stock correction is not necessary.

Note: This quantity must not include leather that undergoes any finishing work.

The auditor must take special cases into account by explaining them in an understandable way in the notes in the tool or on an extra sheet.

All consumption data must relate exactly to this produced quantity. For this reason, input equals output. If you take 100 hides into production (input, regardless of whether they are from stock, current production or purchased), then 100 hides must also come out (output, regardless of whether they go into sales or into stock). One hundred hides were produced. The input and output are not needed for the calculation. The auditor must make sure that these calculations are correct and plausible for the quantities produced, i.e. that they match the capacities of the plants.

Stock and time shifts are not relevant in this type of consideration.

1. Core process production (worksheets 2.1–2.3)

a. Production from raw material

(worksheet 2.1; categories A, C1, C2, F1, F2)

The calculation of the actual specific energy consumption of the company and the comparison with the BEET benchmark is done based on "m² end product", whereby the end product is:
- wet blue or wet white,
- crust,
- finished leather or a
- mixture of the individual products.

A tannery that only limes raw material would not be considered a tannery. If limed hides were to be delivered, this would have to be calculated out using correction factors and explained in the Remarks section.

- **Note: If the tannery in production only processes the rawhide and the flesh split, use worksheet 2.1.**
  If rawhide is used as raw material, the incorporated rawhide weight in tonnes is to be entered in cell B21 (Rawhide). If flesh splits are purchased

and incorporated in addition to the rawhide, the weight of the incorporated flesh splits in tonnes is to be entered in cell B24 (External pelt for split leather).

From the incorporated rawhide in the audited tannery, self-produced flesh splits that are not further processed are to be entered in tonnes in cell G24 (Untanned pelt for split leather).

Wet blue and/or wet white is produced from these raw materials in the production process. The amount of wet blue / wet white produced in the process is to be entered in m² in cell D27 (m² WB/WW).

Of this quantity of WB/WW, a certain amount may end up in the warehouse at the end of the recording period and another amount may be sold during the recording period. The sum of both amounts (stock plus sales) is entered in m² in cell G28 (WB/WW incl. split tanning).

Crust is produced from the self-produced WB/WW in the production process. The amount of crust produced is entered in m² in cell D33 (m² crust). A certain amount of crust leather can end up back in the warehouse at the end of the recording period and another amount can be sold during the recording period. The sum of both amounts (stock plus sales) is entered in m² in cell G34 (Crust).

Finished leather is produced from the crust produced in-house in the production process. The quantity of finished leather produced is to be entered in m² in cell G39, regardless of whether the finished leather was sold or is in stock during the recording period.

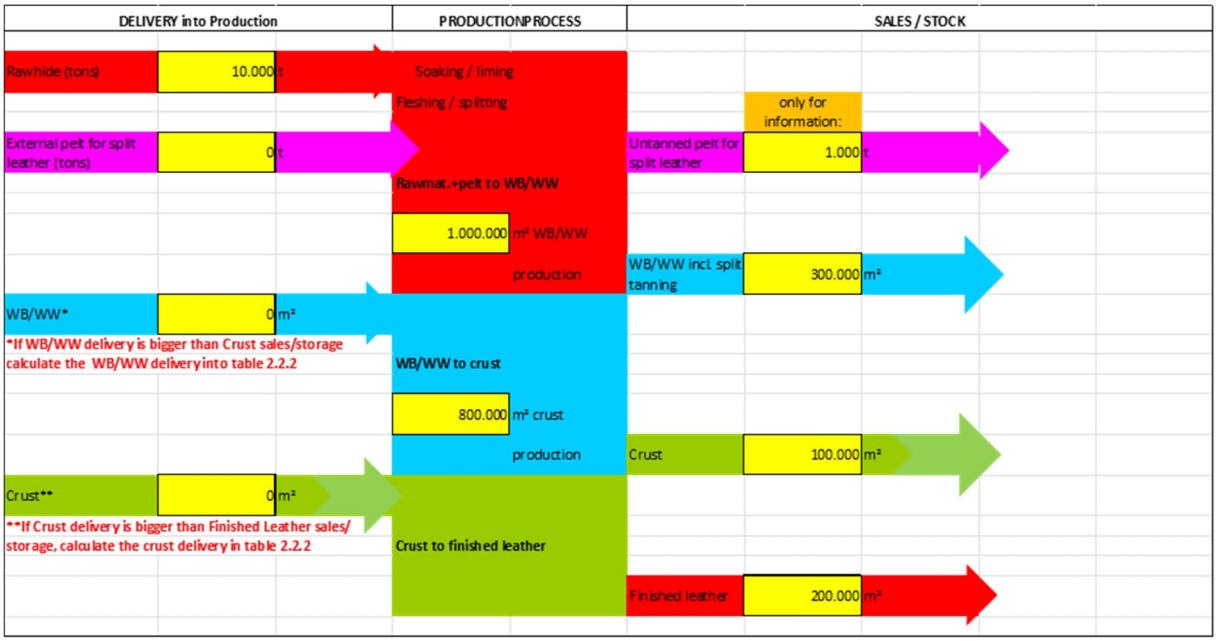

Table 5

- **Note: If the tannery incorporates not only rawhide and flesh split in production, but also bought-in wet blue / wet white and/or bought-in crust, these quantities are to be entered in worksheet 2.2.**

If rawhide is used as raw material, the incorporated rawhide weight in tonnes is to be entered in cell B21 (Rawhide). If flesh splits are purchased and incorporated in addition to the rawhide, the weight of the incorporated flesh splits in tonnes is to be entered in cell B24 (External pelt for split leather).

From the incorporated rawhide in the audited tannery, self-produced flesh splits that are not further processed are to be entered in tonnes in cell G24 (Untanned pelt for split leather).

Wet blue and/or wet white is produced from these raw materials in the production process. The amount of wet blue / wet white produced in the process is to be entered in m² in cell D27 (m² WB/WW).

Of this quantity of WB/WW, a certain amount may end up in the warehouse at the end of the recording period and another amount may be sold during the recording period. The sum of both amounts (stock plus sales) is entered in m² in cell G28 (WB/WW incl. split tanning).

If, in addition to rawhide and flesh splits, wet blue and/or wet white are also incorporated, these quantities must be entered in m² in cell B28 (WB/WW* see table 5).

Crust is produced in the production process from the self-produced and purchased WB/WW. The amount of crust produced is entered in m² in cell D33 (m² crust). A certain amount of crust leather can end up back in the warehouse at the end of the recording period and another amount can be sold during the recording period. The sum of both amounts (stock plus sales) is entered in m² in cell G34 (Crust). If, in addition to the raw materials listed so far, crust is also incorporated, its quantity in m² is to be entered in cell B35 (Crust** see table 5).

Finished leather is produced in the production process from the crust produced in-house and the crust purchased. The quantity of finished leather produced is to be entered in m² in cell G39, regardless of whether the finished leather was sold or is in stock during the recording period.

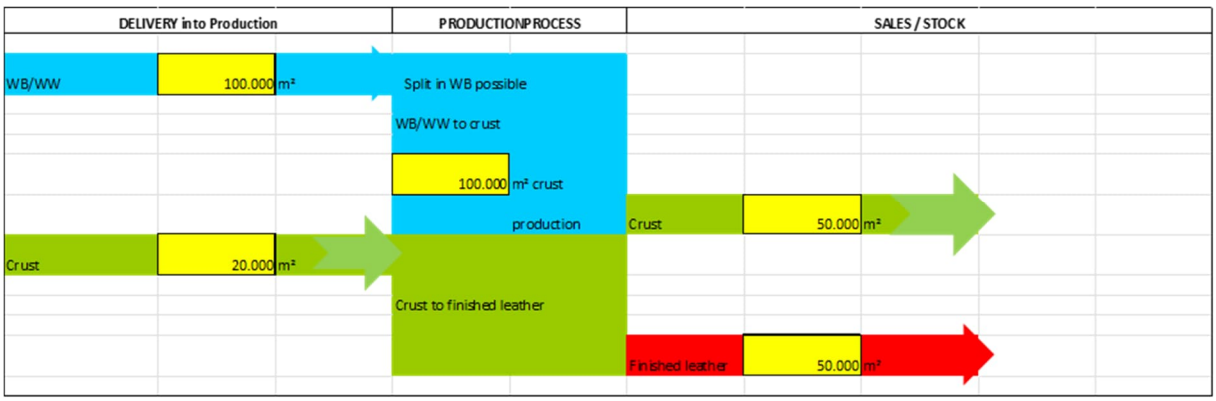

Table 6

Assumptions

There is no change in surface between entering production and leaving (so 100 m² of wet blue becomes 100 m² of crust and 100 m² of crust also becomes 100 m² of finished leather).

Note: If Tables 2.1. and 2.2 are not filled in as described, this will result in a negative number appearing in cell C12.

- **This happens as soon as the amount of m² of purchased WB/WW (cell B29) is greater than the amount of m² of crust produced for stock and sales (cell G34). Hence the explanation under cell B29 to switch to worksheet 2.2 in the event of more m² of WB/WW input than crust output.**
- **Cell B35 contains a similar request for the event that the m² of crust input is greater than the m² of finished leather output. This case is only relevant if there is shrinkage in the production step from crust to finished leather. Since the prompt is found under cell B35, it can be assumed that this can also occur in practice.**

Against this background, it is appropriate to deal with the production processes from rawhide to the respective end products (WB/WW, crust, finished leather) in worksheet 2.1. As soon as bought-in WB/WW and crust are included, these sub-processes are to be dealt with exclusively in worksheet 2.2.

b. Production from wet blue, wet white and/or crust

(worksheet 2.2; categories B, D, E1, E2)

This worksheet is used to record production data for tanneries that:

- Case A – start their process by incorporating wet blue / wet white or even crust first.
- Case B – incorporate wet blue / wet white or crust in addition to rawhide and flesh splits.

Case A:

The quantities of incorporated wet blue and/or wet white (from stocks, own production) are to be entered in m² in cell B29 (WB/WW). Crust is produced from incorporated WB/WW in the production process. The amount of crust produced is entered in m² in cell D33 (m² crust). A certain amount of crust leather may end up in the warehouse at the end of the recording period and another amount may be sold during the recording period. The sum of both amounts (stock plus sales) is entered in m² in cell G34 (Crust).

If, in addition to wet blue / wet white, crust is also incorporated (from stock, own production), its quantity in m² is to be entered in cell B35 (Crust). Finished leather is produced in the production process from the crust produced in-house and the crust bought in. The quantity of finished leather produced is to be entered in m² in cell G39, regardless of whether the finished leather was sold or is in stock during the recording period.

Since only the quantity of articles produced in the recording period (flesh splits, wet blue / wet white, crust, finished leather) forms the basis for calculating the energy efficiency of the tanning process and thus the basis for issuing the certificate, a comprehensive plausibility check by the auditor is required when recording the data. For this purpose, the rawhide weights,

origin of the goods, leather thicknesses and yield figures must be compared with the quantities given in the table.

Case B:
If, in addition to rawhide and flesh splits, the tannery also uses purchased wet blue and/or wet white and/or purchased crust in production, these quantities and production steps are to be recorded in worksheet 2.2.

The quantities of wet blue and/or wet white incorporated is to be entered in m² in cell B29 (WB/WW). Crust is produced from incorporated WB/WW in the production process. The amount of crust produced is entered in m² in cell D33 (m² crust). A certain amount of crust leather may end up in the warehouse at the end of the recording period and another amount may be sold during the recording period. The sum of both amounts (stock plus sales) is entered in m² in cell G34 (Crust).

If, in addition to wet blue / wet white, purchased crust is also incorporated, its quantity in m² is to be entered in cell B35 (Crust). Finished leather is produced in the production process from the crust produced in-house and the bought-in crust. The quantity of finished leather produced is to be entered in m² in cell G39, regardless of whether the finished leather was sold or is in stock during the recording period.

The recording period only considers the actually produced quantities of articles (crust, finished leather), irrespective of their use (stock or sale). This is the basis for calculating the energy efficiency of the tanning process and thus the basis for issuing the certificate. This requires a comprehensive plausibility check by the auditor when the data is recorded. The origin of the goods, the leather thicknesses and yield figures are to be compared by the auditor with the quantities given in the table.

c. Rawhide preservation
(worksheet 2.3; categories A, C1, C2, F1, F2)

Worksheet 2.3 is only to be completed for tanneries that **process rawhides**. For tanneries that only work from wet blue / wet white onwards, no entries need to be made here.

In this calculation sheet, the **CO_2 equivalents of the upstream process of rawhide preservation are determined.** The product category rules of DIN EN 16887 are applied analogously for the calculation of the CO_2 equivalents of rawhide preservation.

The starting points of the calculation are:
- The CO_2 emissions that arise during the production of salt. They have been set at 0.145 kg CO_2/kg NaCl (cell C10).
- The necessary amount of salt required for different types of preservation. Thus, for preservation it is
  a) with dry or wet salt 300 kg salt/t rawhide (cell I19) and
  b) for brine preservation 225 kg salt/t rawhide (cells K19 and M19).
  c) If the type of rawhide preservation of some or all of the rawhides is not known, a salt quantity of 400 kg salt/t rawhide (cell E19) is applied for this part.

In row 13, the distribution of the processed rawhides according to the respective type of preservation is entered in % (cells G–H13, I–J13, K–L13, M–N13). A distinction is made between:

- Only chilled rawhides (cells G–H13).
- Rawhides preserved with dry or wet salt (cells I–J13).
- Prefleshed rawhides preserved with brine, where the defleshing by-products were further processed into biogas or biodiesel (regardless of who did the further processing) (cells K–L13).
- Prefleshed rawhides preserved with brine, where the defleshing by-products were further processed into fat or food etc. (regardless of who did the further processing) (cells M–N13).
- Rawhides for which the preservation type could not be determined (cells E–F13). An estimated assignment of the undeterminable preservation type(s) to other preservation types is not permissible.

Note: If brine-cured, prefleshed hides have been obtained and it is not known how the defleshing by-products have been further used, they should be listed under the heading "Brine cured/prefleshed & fleshings go to fat / food recycling etc" (cells M–N13).

The brown cells in the tool in rows 15 and 16 contain non-publicly available data and calculations on CO_2 emissions from rawhide production and salt production.

Desalination machine: If the tannery has a desalination machine with which the salt can be recovered in such a way that it can be reused, the applicable CO_2 emissions are reduced. This is taken into account by entering a "y" in cells E–N17. If no such desalination machine is available, an "n" must be entered in these cells.

When processing rawhides as raw material, the tannery can enter in this table the proportions of chilled, wet or dry salted and brine-preserved prefleshed raw material as well as the use of a desalting machine, and the reuse of the separated salt. The CO_2 equivalents of the upstream process of rawhide preservation are reduced accordingly.

Note on fleshing: There is no point in fleshing if the raw material obtained is not used. Even when selling the fleshing waste, the use must be clear, i.e. biogas or fat extraction. Disposal in a landfill is not possible in Europe. Without an explanation, the maximum value is used.

During the audit, the auditor must ask which hides are purchased by the tannery from ECO_2L-certified hide traders. The corresponding percentages of hides purchased from ECO_2L-certified hide traders are to be entered in cells G–H22, I–J 22, K–L22 and M–N22, depending on the type of preservation.

If multiple batches of hides and skins with the same preservation method have been purchased from different ECO_2L-certified hide traders, the percentage share of all these lots in the total number of hides processed must be entered in the cell corresponding to the preservation method. A corresponding reference to this fact is to be indicated in the Remarks.

In cells G–H23, I–J23, K–L23 and M–N23 the values of the CO_2 emissions from the audit documents of the ECO_2L-certified hide traders in kg CO_2/t rawhide are to be entered.

In the case that multiple batches of the same conservation type were purchased from different hide traders, the weighted average of the CO_2 emissions of all hide traders within this conservation type shall be calculated and entered in the corresponding cell. The calculation of the weighted average must be presented in the Remarks.

Weight per hide and area per hide: Cells I–J27 to K–L29 contain standard data on rawhide, wet blue / wet white and crust processing levels in terms of weight per hide and area per hide.

If other values are determined in the audited tannery (e.g. heavier hides or smaller hides) (e.g. heavier hides or smaller hides), these values can also be entered in the corresponding cells. The values must again be determined by the weighted average of all hides processed in production and must be documented in the Remarks.

If no data is available or if a determination is too time-consuming, the default values in the tool may be used.

2. Correction factors (worksheet 2.4)

The BEET benchmark is designed to measure the energy efficiency of the production of shoe upper leather and upholstery leather from salt-preserved bovine hides. The splitting of the hides after liming and fleshing as well as the further processing of the uncrouponed flesh splits until at least after tanning (i.e. wet blue / wet white condition or later) is also considered as standard.

If tanneries whose production deviates from this standard apply for an audit, the ECO_2L Working Group must decide in each individual case before the audit whether the production can be represented by the existing correction factors.

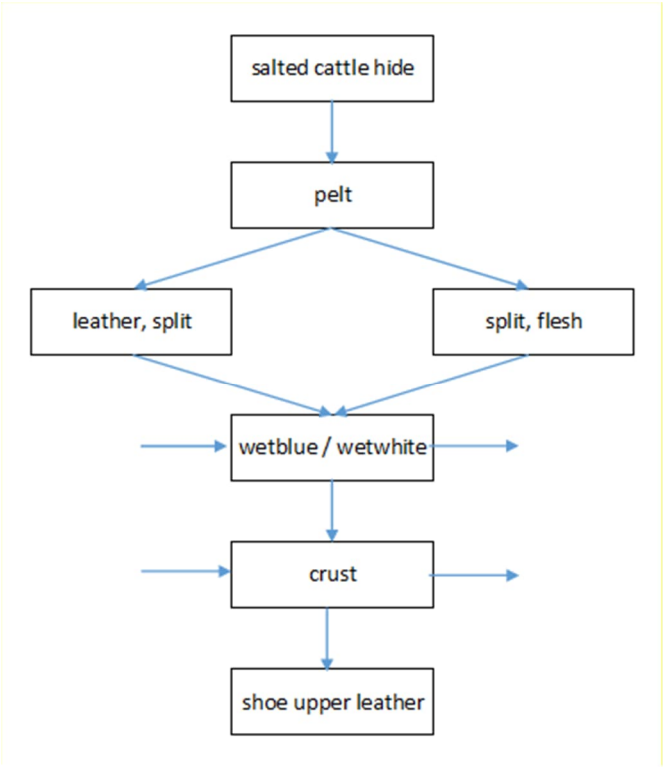

Figure 2: Flow chart of the standard core processes of leather production according to BEET

Increasing specialisation, different utilisation methods (e.g. collagen production from the flesh split) and frequently also different quality requirements make deviations from the production method outlined above necessary. It is therefore necessary to carry out a specific adjustment to the given local conditions in the audited company by means of **correction factors.** For this purpose, a **company-specific BEET comparison value,** which corresponds to the internationally applicable **standard energy reference value BEET,** is calculated.

Without such a comparative value via the correction factors, distortions arise because one would compare the **actual specific energy consumption** of the company's specific production (**actual value**) with the standard production of the BEET.

The percentages of production or of rawhide or flesh split weights incorporated or sold to be indicated for the correction factors are to be entered based on the produced surface data and incorporated or initial weights submitted by the company after verification by the auditor.

The result of the comparison of the company-specific, correction-factor-adjusted BEET reference value with the actual specific energy consumption value of the company is the decision criterion for awarding the ECO_2L label. Only if the actual, company-specific energy consumption exceeds the company-specific, correction-factor-adjusted BEET comparison value by a maximum of 20% will the audited company be awarded the ECO_2L label.

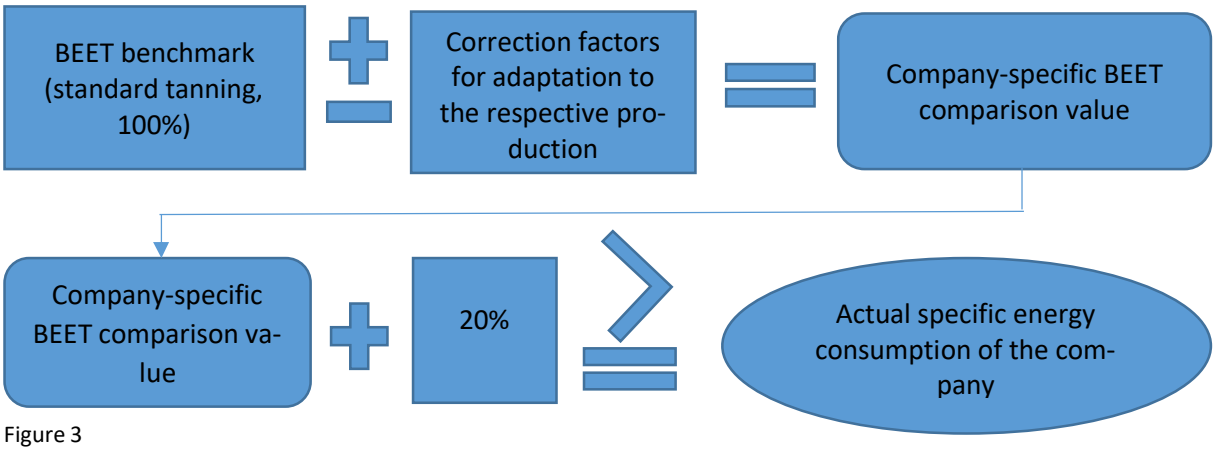

Figure 3

Example 1:

BEET benchmark:		27.74 MJ/m²
Correction factors:		12.75%
Company-specific BEET comparison value:	27.74 MJ/m² + 12.75% =	31.28 MJ/m²
	31.28 MJ/m² + 20% =	37.54 MJ/m²
Actual specific energy consumption:		35.28 MJ/m²
Result:	Audit passed	
Justification:	Actual value > comparison value, but difference < 20%	

g. Deviation of the leather thickness

The influence of the leather thickness on the energy demand of the production is significant. The desired thickness of the finished leather is already taken into account during splitting and reduced to the target thickness by folding. The leather thickness thus influences about 95% of the total energy consumption (all processes after splitting) in the production from rawhide to finished leather.

The most energy-intensive sub-steps (tanning, wet finishing, drying) are almost linearly dependent on the thickness of the leather, as the drums are loaded by weight and during drying the amount of energy consumed depends on the amount of water to be evaporated. The standard BEET is determined for leather with an average thickness of 1.25 mm. Thus, thicker leathers would have an energetic disadvantage, thinner leathers an energetic advantage.

It is therefore necessary to determine the area-weighted mean value of the leather thickness and enter it for the calculation of the BEET comparison value. The determined correction factor is applied to all production stages.

Example 2:

The tannery produces 80 m² of finished leather with 1.4 mm thickness, 40 m² of finished leather with 1.2 mm thickness, 100 m² crust with 1.8 mm thickness and 200 m² wet blue. In this case, the area-weighted average of the leather thickness is:
(80 * 1.4 + 40 * 1.2 + 100 * 1.8) / (80 + 40 + 100) = 1.55 mm.

D. Downstream processes

The ECO_2L 2.0 tool calculates the CO_2 equivalents based on the product category rules of DIN EN 16887. This regulation has defined the system boundaries as being from "cradle to gate". Therefore, the ECO_2L 2.0 tool does not consider the CO_2 emissions from the use phase of the leather. Similarly, the CO_2 emissions of the leather after the end of its useful life are not considered in the ECO_2L 2.0 tool.

This approach makes sense, as the CO_2 emissions from the use phase of the leather can differ greatly depending on its intended use. In a more extensive product-related consideration, a distinction would at least have to be made between the types of use of different types of leather.

Nevertheless, downstream processes of wastewater and waste treatment as well as the resulting CO_2 equivalents must be taken into account in order to be able to determine a product carbon footprint of the product mix produced by the company.

1. Wastewater (worksheet 3.1)

The CO_2 emissions associated with the transport of wastewater to the treatment plant and the treatment of the wastewater in the in-house pre-treatment and/or a downstream, central industrial or municipal wastewater treatment plant are recorded in the product carbon footprint in this worksheet.

If the company's wastewater is discharged directly into a body of water or other receiving water after treatment, the internal recording of the energy expenditure and calculation of the CO_2 emissions during wastewater treatment is already complete.

The energy consumption for chrome recycling (if available in the tannery – row 12 in the worksheet) and for the remaining wastewater treatment can be recorded separately (row 13 in the worksheet). However, separate recording is not mandatory.

If, however, the in-house treatment is only a pre-treatment stage with the aim of maintaining certain parameters before mixing with other wastewater, the energy input for pre-treatment within the tannery (cell G15) must be recorded and the energy input of the downstream, central industrial or municipal wastewater treatment plant must also be recorded and included (row 14 in the worksheet). For this purpose, the chemical oxygen demand (COD concentration) of the wastewater leaving the tannery must be known. The energy input of the downstream, central industrial or municipal wastewater treatment plant is fixed at 0.833 kWh/kg COD (cell F14).

If the **COD value** is **not known** and is not determined, the audit can be continued, but a value for the product carbon footprint must not be given. An estimate is not possible here.

2. Waste (worksheet 3.2)

This worksheet calculates the total annual amount of CO_2 equivalents emitted by the resulting waste.

The CO_2 emissions generated during the transport of the waste to the recycler/disposer are determined as an essential point. The summary of these emissions is calculated in columns AC/AD of the worksheet.

CO_2 emissions from the transport of by-products and co-products are not included in the calculation in the ECO_2L 2.0 tool, as these materials are usually used as raw materials for other industrial sectors (e.g. gelatine, fat or protein) and are thus to be assigned to the PCF of the further processor in accordance with the product category rules of DIN EN 16887.

Since waste is usually transported by lorry, the transport route to the recycler or disposer is valued at 0.075 kg CO_2/t of waste and km.

Depending on the recovery/disposal, the waste either generates further CO_2 emissions (e.g. if landfilled – columns U/V/W of the worksheet), the waste is treated as emission-neutral (e.g. if used as a raw material for another product – columns C/D/E of the worksheet) or the tannery may even receive an emission credit (e.g. if another raw material for the other product can be substituted by the waste – columns I/J/K and others). The balancing of these emissions or credits is done in columns AE/AF of the worksheet.

Waste description	Material reuse or recycling as a by-product for the production of the same/another new product: e.g. protein for cosmetics, tallow for soap, bonded leather, gelatine.	Material recycling as building material, landfill building material, bricks, cement industry, paper, wood, plastic, metal, leather goods.	Material utilisation as compost, fertiliser in agriculture, in forestry.	Recycling of tallow and use as fuel, e.g. biodiesel, direct fuel use (only applicable for rawhide and limed material).	Thermal waste utilisation (combined heat and power plant) primarily for energy use and substitution of fossil fuels, biogas processing.	Thermal utilisation as gasification treatment with energy (gas) utilisation. For > 85% DS sludge, wood, chips etc.	Landfill or waste disposal site, waste disposal.	Residual and hazardous waste, incineration primarily for thermal disposal.
	kg CO_{2e} /t (- = credit; + = debit)							
Rawhide cuttings (lime fleshings, lime cuttings), external	0	0	-270	-119.5	-77		2,014	
Rawhide cuttings (machine glued leather, canting glued leather), internal	0	0	-270	-239	-154		2,014	
Tanned sections (folding shavings, trimming waste)	0	0	-270		-221		2,216	372.5
Grinding dust, tanned	0	0	-270		-221		3,767	372.5
Leather cutting waste, dyed	0	-1,529	-270		-221		3,767	372.5
Sewage sludge 40% dry matter	0	0			24	-1,300	1,151	900
Wood waste	0	0			0		5,834	1,268
Waste oil	0	0					2,640	2,700
Paper accrual	0	-1,926			-1,060		4,674	1,300
Plastic waste	0	-2,408			-1,862		0	1,850
Metals	0	-803					0	
Household waste	0	0					1,800	372.5
Special hazardous waste / chemical residues	0	0					1,800	622.4
Hair			-180					

Table 7: Waste, its recovery routes, and the assessment of CO_2 emissions

The 1% rule applies here. Ninety-nine per cent of the waste must be covered. Special cases must be forwarded to VDL or mentioned in the Remarks.

Overwriting default values: Table 22 provides a brief overview of the possible disposal and recovery routes and their default values.

In accordance with DIN EN 16887, the ECO_2L 2.0 tool offers the possibility to overwrite the standard data stored in the tool on the basis of secondary data with the company's own data, determined quantitatively by direct measurement or calculation based on direct measurement. This data has to be proven to the auditor.

ECO_2L 2.0 distinguishes between the disposal as well as the material and thermal recycling of waste. The thermal utilisation of waste is again assessed according to the
- internal or
- external

energy use. This distinction is crucial for the determination and assessment of CO_2 emissions from waste treatment, which are calculated using secondary data.

Waste recovery or disposal is assessed as **CO_2 emission neutral** if internal or external mechanical recycling or incineration with internal energy use takes place. Regarding thermal recovery with external energy use or feedstock or material recovery that yields energy advantages compared to production from raw materials, the CO_2 emissions of this disposal route are assessed with a credit in relevant databases (6, 7, 8).

When **waste is recycled,** it is primarily the material properties that are used, and the waste is fed back into the economic cycle. In doing so, it can replace other raw materials. Material recovery can be both material recovery (e.g. landfill substitute building material, aggregate for cement production) as well as raw material recycling (e.g. canting glue leather for gelatine production). Therefore, an emissions-neutral assessment is also carried out in the ECO_2L 2.0 tool.

In **external energy recovery,** waste with a high calorific value is used as a substitute for conventional energy sources to generate electricity and heat. This use of waste as a substitute fuel can save fossil fuels and thus contribute to the conservation of resources. Therefore, the ECO_2L 2.0 tool also evaluates the CO_2 emissions with a credit.

In the case of **thermal recovery with internal energy use,** the use of the substitute fuel already reduces CO_2 emissions in the core process. On the other hand, energetic expenditures for waste treatment may be necessary. Therefore, in the ECO_2L 2.0 tool, the CO_2 emissions are also assessed with a credit, albeit lower than with external recovery or energy use.

3. Supply chain

In the calculation of the CO_2 emissions data at the site, the different degrees of processing of the raw materials or semi-finished products used in the input of the audited companies are taken into account. The evaluation of the preliminary products is carried out via the emissions data of the upstream supply chain.

- Supply chain details (worksheet 4.1)

The recording of the company's own energy consumption and the determination of the associated CO_2 emissions data (core process) is carried out via worksheets 2.1 and 2.2 (see there). However, since most companies do not work exclusively from the raw material, but also incorporate split, wet blue, wet white and/or crust from other suppliers, the CO_2 emissions data of this upstream supply chain must also be determined and included.

This sheet must therefore indicate how many primary products are procured in which production state from ECO_2L-audited and from non-ECO_2L-audited tanneries during the period under consideration.

For the pre-production of semi-finished products sourced from non-ECO_2L-audited tanneries, the tool calculates the CO_2 emissions data using benchmark data obtained from previous audits.

For semi-finished products originating from ECO_2L-audited tanneries, the supplier's CO_2 emissions data for this semi-finished product must be used for the further calculations of the ECO_2L 2.0 tool.

The results of the pre-supplier evaluation are of course included in the evaluation of the company's own products.

V. Certificate

A. Issuing of the certificate

The certificate is only issued by VDL. It can only be issued if:

- the client was able to complete the preparatory work in time (preparation tool),
- the audit could be carried out by the auditor within the framework of the Guidebook,
- the peer review has been passed and
- the values of the audit are within the requirements of the Guidebook.


ECO2L Energy Controlled Leather

Lederfabrik Mustermann
Straße 1-3
12345 Musterstadt
Deutschland

produziert am Standort energieeffizient und berechnet den CCF / PCF (Produktmischung) nach Maßgabe des ECO_2L-Programms.

Registrierte Audit-Nummer:	000
Kategorie der Produktion:	Wet-Blue/Wet-White/Wet-Green zu Fertigleder
Lederart:	Oberleder
Auditprotokoll:	ECO_2L 8.5.11-2023
Auditor:	Dipl.-Ing. Jutta Knödler
Peer Review:	FILK Freiberg Institute gGmbH

Andreas Meyer, Geschäftsführer VDL

Auditdatum: 1. Januar 2023 Audit gültig bis: 1. Januar 2026

VDL Verband der Deutschen Lederindustrie e.V. German Leather Federation Mainzer Landstraße 55 60329 Frankfurt am Main Telefon +49 69 97843141 Telefax +49 69 78800009 info@vdl-web.de www.vdl-web.de

Figure 4

B. Validity of the certificate

The certificate is valid for three years for audits that have been or will be carried out by the end of 2023. From 1 January 2024, certificates will be valid for two years, with the option to extend for one year. In the case of cooperation with the Leather Working Group (LWG), there will be a mutual approach to be able to carry out the audits together.

In accordance with the LWG agreements, new companies can order an audit after six months of operation, but this is only valid for one year. After twelve months, a new audit must take place, which is then possible as a video audit.

C. Extension / Remote audit / Covid adjustments

Due to difficult situations for travel (e.g. due to Covid restrictions), the time periods between the last audit and the current date may be extended. To avoid this, the ECO_2L Working Group can decide on extensions of the validity of the audits. An extension is only possible twice, but for a maximum of three years in total. After that, a new audit must take place.

The members of the ECO_2L Working Group have therefore decided that new audits can only be accepted if on-site audits are possible. This means that companies that have not yet had an ECO_2L audit accepted can apply for audits if a visit is possible.

D. Remote audits (video audits)

Audits can alternate between on-site and video audits. The first audit must always take place on-site. After that, it is possible to switch between video and on-site audits.

Annex

Common calculation factors
If a tannery does not have any internal calculation parameters, the following data can be used.

Fresh hide bull	37-51 kg
Average hide weight bull	45 kg
Average hide weight cow	35 kg
Average German cattle hide	36-39 kg
Average cattle hide	28 kg
Green weight:	100 %
Salted weight	90 % of green weight
Pelt weight	70-95 % of green weight
Pickle weight	65 % of green weight
Average size sqm/bull hide (German)	3,25 – 5 m^2
Area and weight return of a rawhide:	
USA Packers (23/27 kg)	0,158 m^2/kg
Argentine cattle (14/16 kg)	0,141 m^2/kg
Scandinavian cattle (17/24 kg)	0,185 m^2/kg
Cows Central Europe (30/39,5 kg)	0,154 m^2/kg
Bulls Central Europe (30/39,5 kg)	0,122 m^2/kg