User Manual – Packaging Cockpit

v2.0

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Welcome to the Packaging Cockpit

Before using the Packaging Cockpit, please carefully read the user manual as an orientation and input aid.

For further information concerning the circularity of your packaging, please contact our support.

1. Login

A login is required to use the Packaging Cockpit. The username and password must be entered in the login window. The language (German and English available) can be set by clicking on the globe symbol in the right corner (Figure 1).

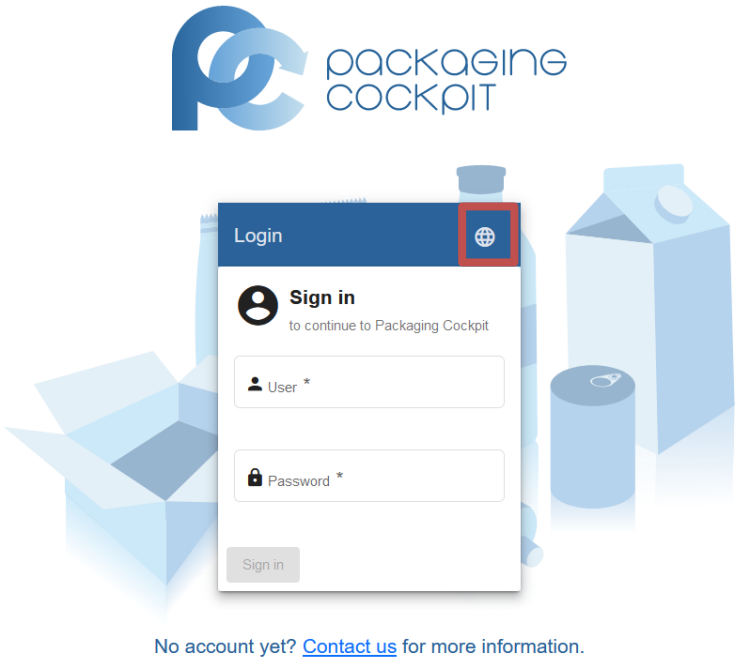


Figure 1: Login

In case you do not have an account yet, please contact us via the link under the login window.

2. Home

After logging in, you are directed to the home page. Here you can find your recently edited packaging systems, units, components, and materials and a navigation menu (Figure 2). The same navigation menu can be found as drop-down selections in the header.

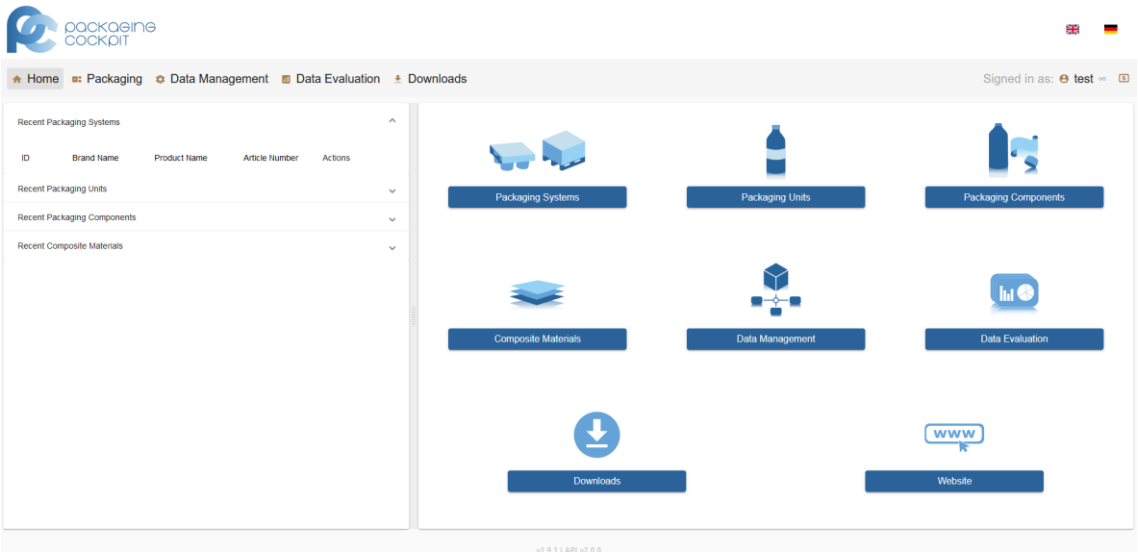


Figure 2: Home

In the right-hand corner of the page (Figure 3), several settings can be managed, for example the languages. The Packaging Cockpit is available in English and German.

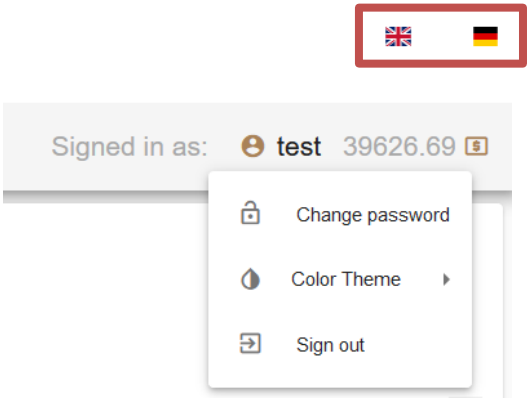


Figure 3: Settings

A dropdown menu opens when clicking on the username. Here you can change your password, sign out of the account, or switch between light and dark mode (Figure 4).

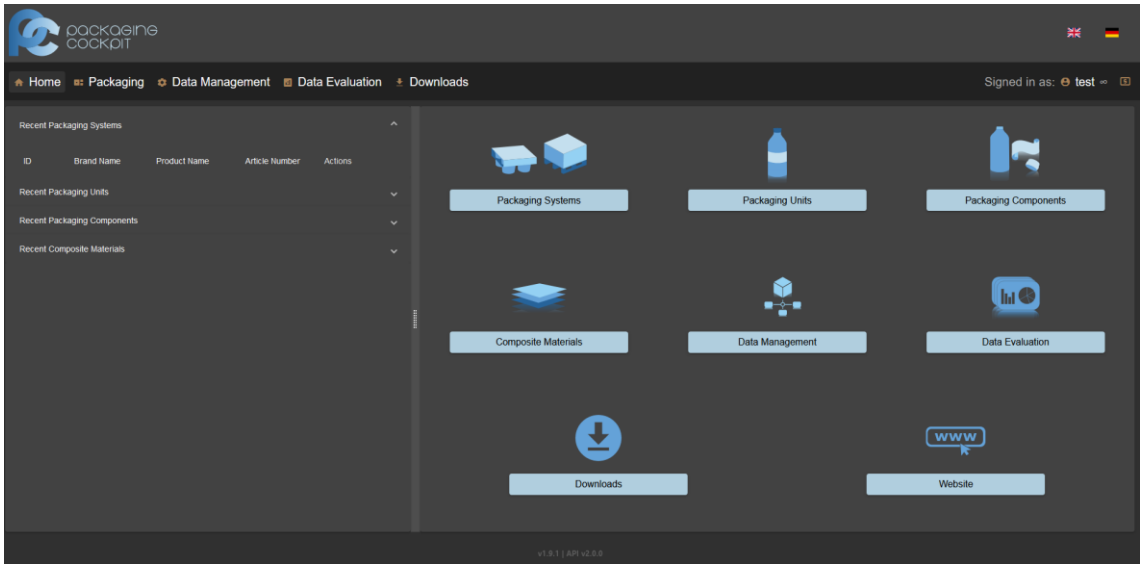


Figure 4: Dark Mode

Your credits, which can be redeemed for calculations, are shown next to the user name. Each recyclability analysis or life cycle assessment costs one credit per country.

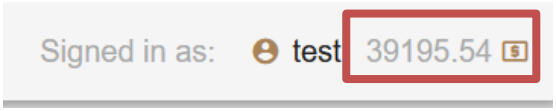


Figure 5: Credits

There are several selectable menu items in the header of the Packaging Cockpit (Figure 6). By clicking the "Home" button, the main page is loaded.

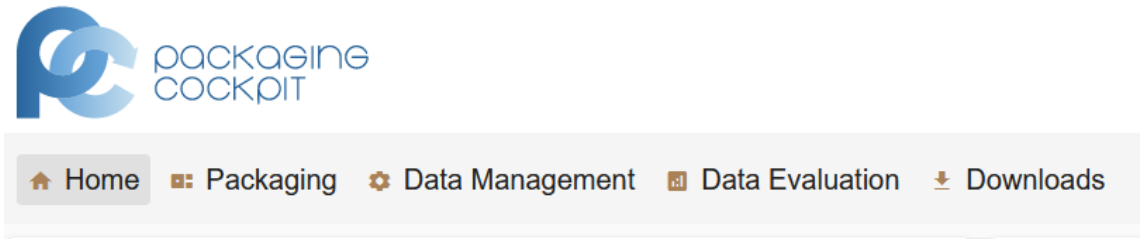


Figure 6: Header

In the “Systems”, " Units", "Components" and “Composite Materials” areas under “Packaging” (Figure 7), packaging systems, units, components, and materials can be displayed and filtered by type.

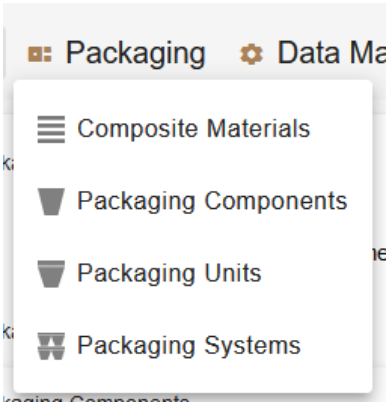


Figure 7: Menu- Packaging

In "Data Management" (Figure 8), the data directory can be found, which allows the management of packaging systems, units, components, and materials. Further, all these data can be imported from other user over the respective import pages.

The Data Management dropdown further allows navigation to an overview of all used tags, the user data, a page for the coordination of export profiles, and an overview of all created reports and report templates. All of these functionalities will be explained in detail within this user manual.

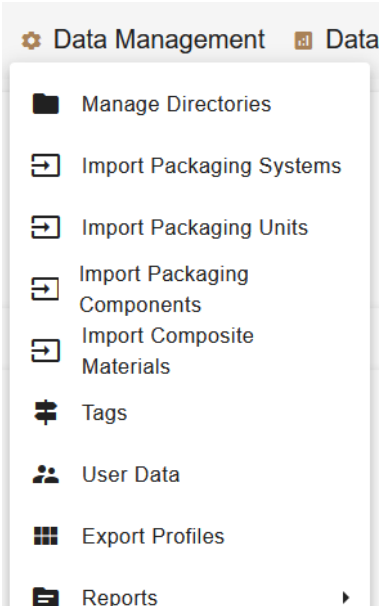


Figure 8: Menu- Data Management

In “Data Evaluation” aggregated calculations for several packaging systems, units or the entire packaging portfolio can be carried out.

Under “Downloads”, the user manual, Packaging Design Guideline, and calculation methodology can be downloaded.

3. Creating a Packaging Unit

3.1. Packaging Units

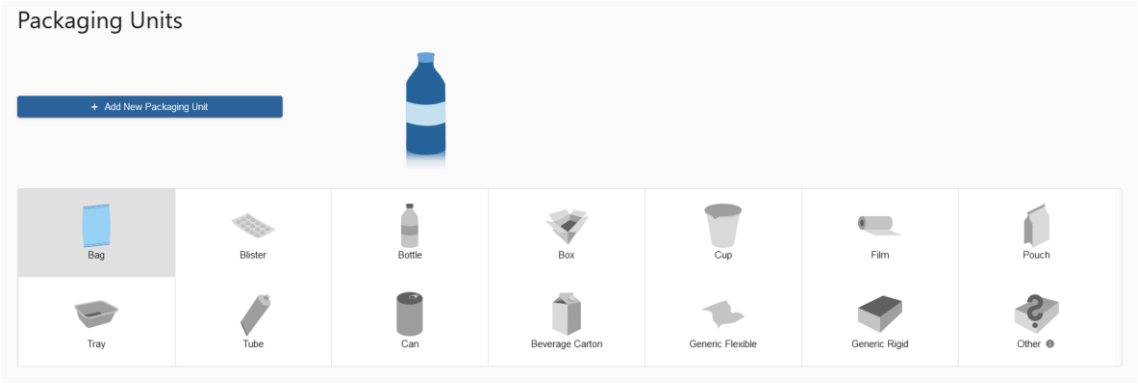


Figure 9: Packaging Unit Types

Clicking on "+ Add new packaging unit" creates a new packaging unit (Figure 9). Packaging units that have already been created are sorted by packaging type and can be filtered according to several criteria (e.g. product name). The order of the displayed packaging units can be reversed by clicking on the arrow next to the criterion.

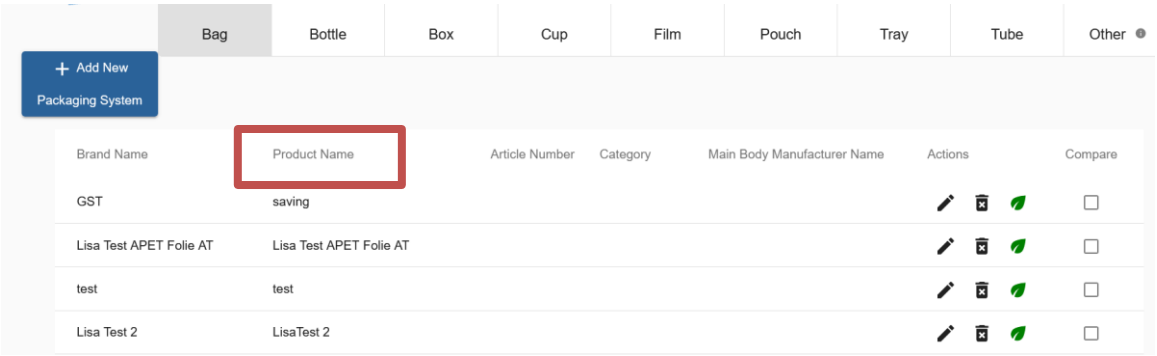


Figure 10: Filtering Criteria

Clicking on the respective search field opens a window in which additional specific values can be filtered out.

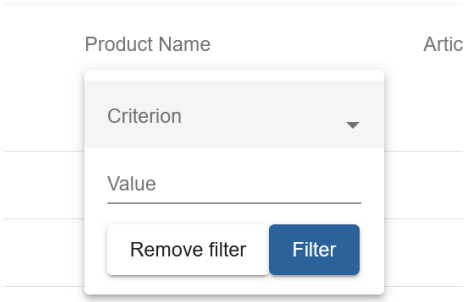


Figure 11: Filter Details

3.2. Example: Type Bottle

After clicking "+ Add new packaging unit" a new page opens, where all necessary information about the unit can be filled out (Figure 12).

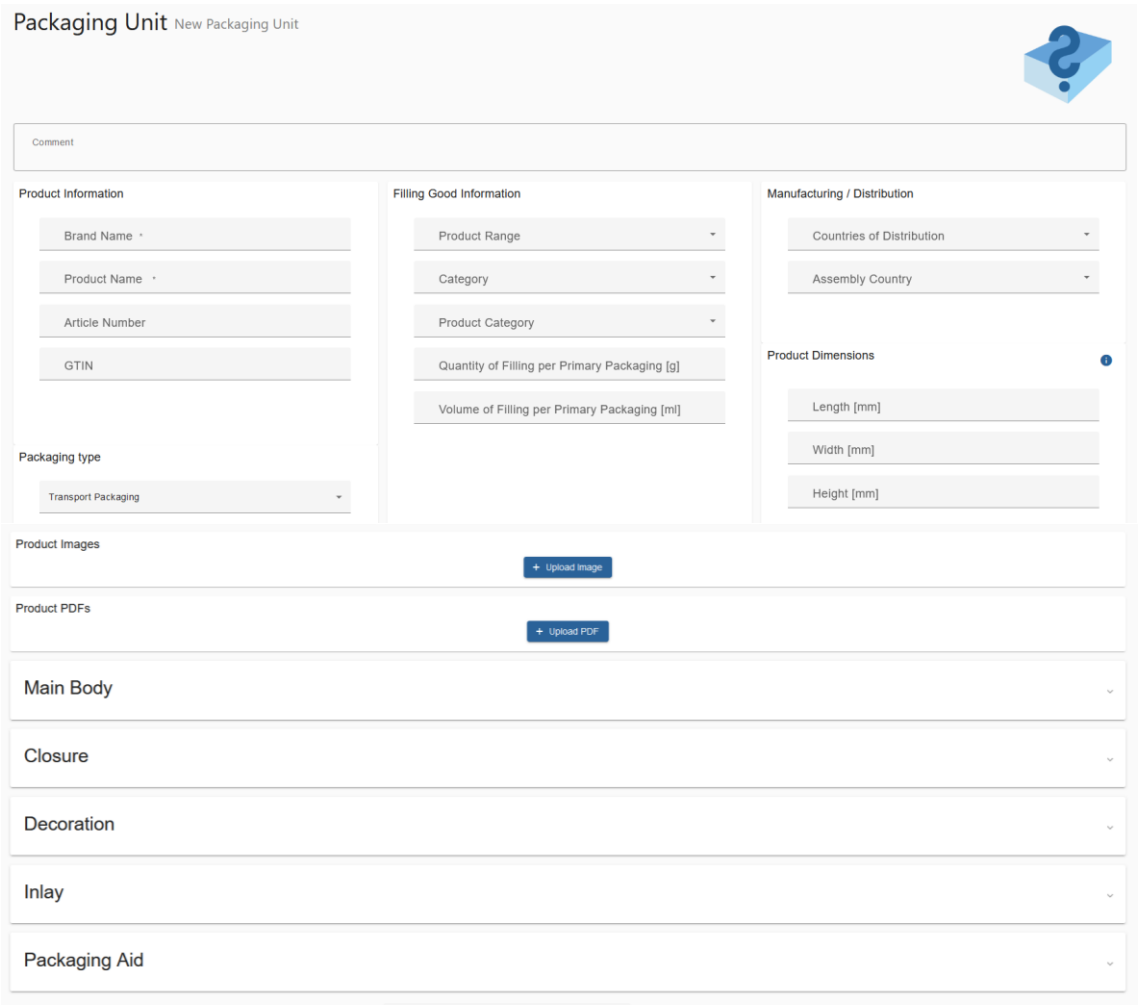


Figure 12: Packaging Unit Information

3.2.1.1. Basic Information

The product information includes the name and brand of the product and must be filled out to identify the packaging unit.

- A packaging type must be selected, either consumer packaging or transport/industrial packaging.
- Information about the filling good is not required for calculations, however, filling volume or mass can be used to normalize LCA data in calculations and comparisons of packaging units.
- For some fields, values must be selected from a drop-down menu.
- All fields marked with * are mandatory for saving a file.
- Under manufacturing information, the distribution countries must be selected (Figure 13). Since collection, sorting and recycling structures differ from country to country, this information forms an important basis for calculation. Recyclability and Life Cycle Assessments are calculated individually for each country.

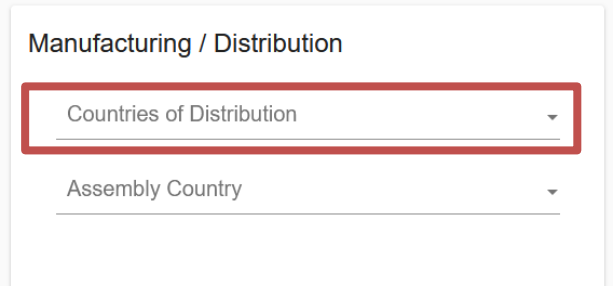


Figure 13: Countries of Distribution

The assembly country is the country where the packaging unit is assembled, or the product is filled.

3.2.1.2. Product Images

In the next step, one or more images of your packaging unit can be uploaded. Images saved on your computer can be selected under "Upload image" (Figure 14).

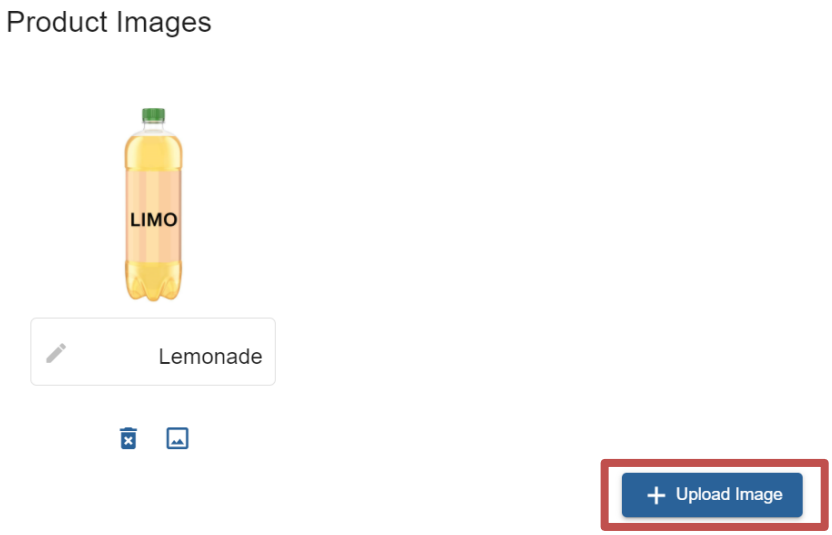


Figure 14: Uploading Product Images

Individual images can be deleted by clicking on the trash can symbol. A cover image can be selected, which will appear in the evaluation report (Figure 15).

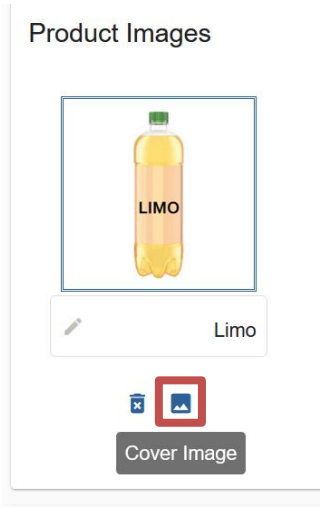


Figure 15: Selecting a Cover Image

3.2.1.3. Main Packaging Body

In the next step, information about the main packaging body is entered (Figure 16). By clicking on "+Add New Main Body" a pop-up window opens for the input of data (Figure 18).

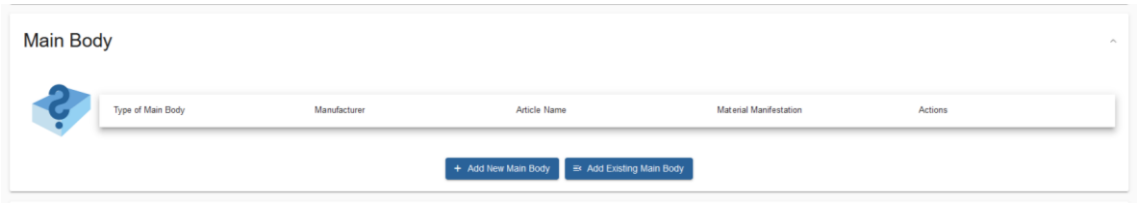


Figure 16: Main body

Alternatively, a main body which already exists in your system can be imported by clicking "Add Existing Main Body". A list of all available components opens, and the desired main body can be selected (Figure 17). The main body can be added either with or without tracking (as explained in section 11.4.2).

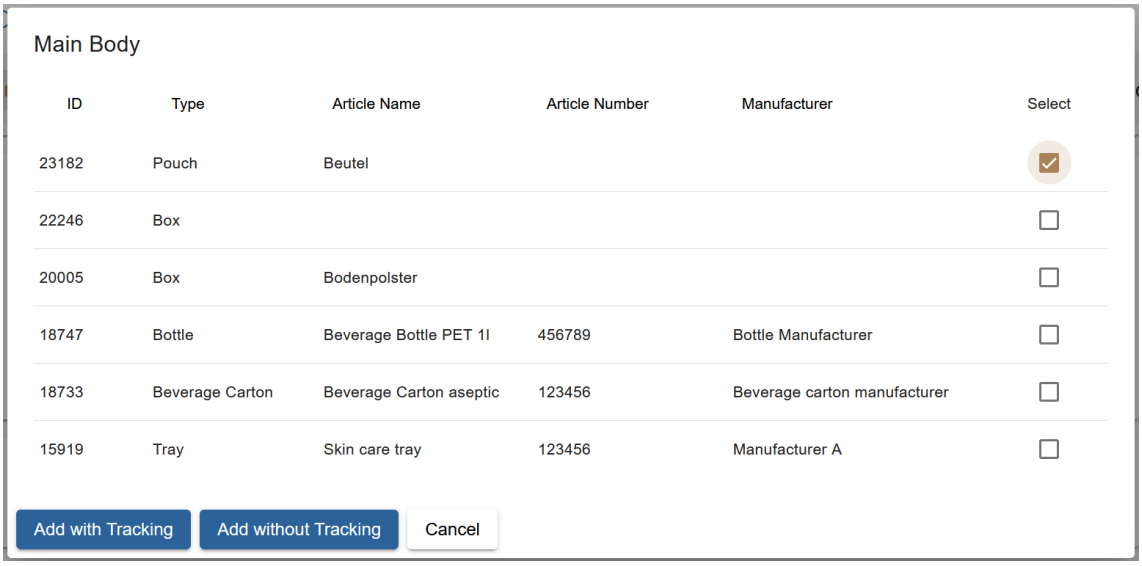


Figure 17: Import Existing Main Body

When adding a new main body, the following main body types are available:

Main Body	Definition
Bag	A flexible packaging, with an opening at the top
Blister	Packaging body with a cavity or pocket, often formed by thermoforming, mostly lidded with board or film
Bottle	A container with a narrow neck containing liquids
Box	A square or rectangular container with stiff sides and sometimes a lid
Cup	A cone shaped packaging with a flat bottom and an open top, lidded with film or other lid
Film	Thin flexible packaging
Pouch	A flexible packaging, with an opening or spout at the top (e.g. retort pouch, stand-up pouch)
Tray	An open receptacle with a flat bottom and a low rim
Tube	A collapsible package made of a cylindrical, hollow piece with a round or oval profile
Can	Cylindrical container, usually made of metal, made from 2 or 3 parts
Generic Flexible	Any other type of flexible packaging
Generic Rigid	Any other type of form stable packaging
Other	Any other type of packaging **This type of main body cannot be used for calculations!**

In the next step, basic information is added, just like for the packaging unit itself (Figure 18). There are some other field which must/can be filled.

- The printing coverage is given in percentage of surface that has been printed. If the main body is not printed, the field must be filled in with "0".
- It can be selected whether the packaging is rigid or flexible. This field is prefilled depending on the selected main body type but can be changed manually.
- When calculating multi-layer materials, the field "Total grammage of the main body" can be filled in, but the field is not a mandatory field. The sum of the specified material weights is displayed in the "Total weight" field. This field is calculated automatically and cannot be filled out.

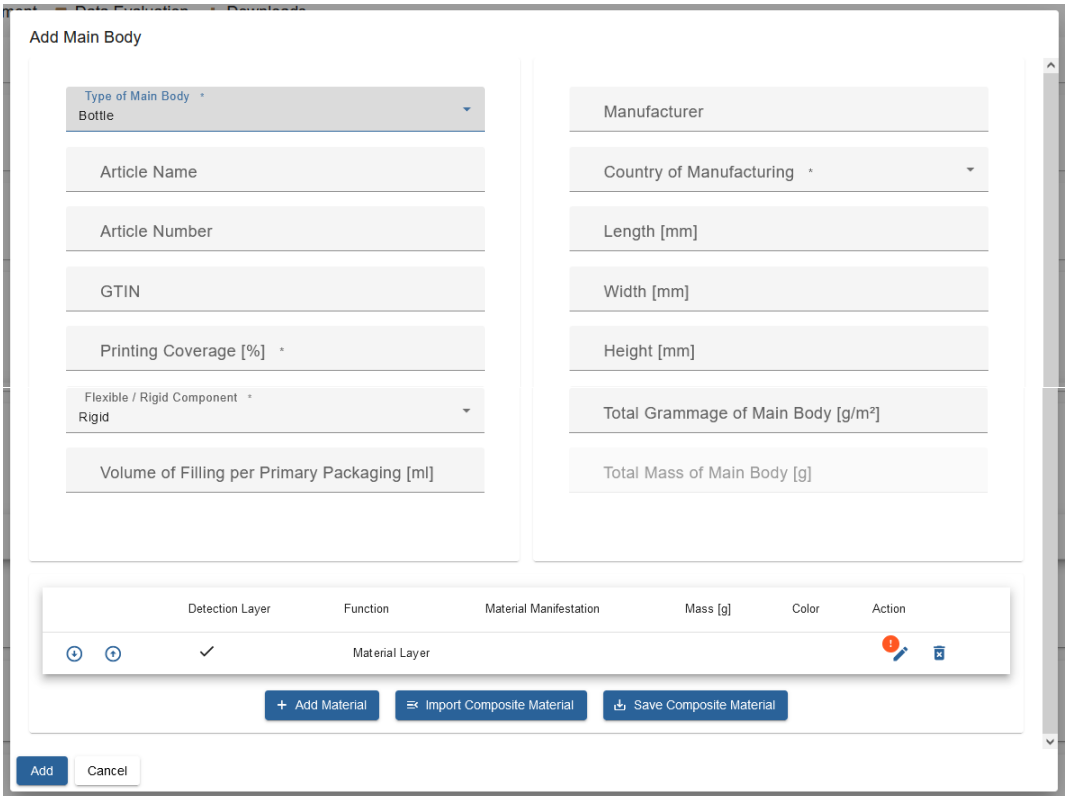


Figure 18: Main Body General Information

- The dimensions of the main body are specified in length (=depth), width, and height in mm. At least two of the dimensions have to be filled out in order to conduct a calculation and should be entered as follows.

Flexible/ 2D packaging (Figure 19)

- Length (=depth): largest dimension of longest side
- Width: largest dimension of the broadest side
- Height: optional, if specified = layer thickness

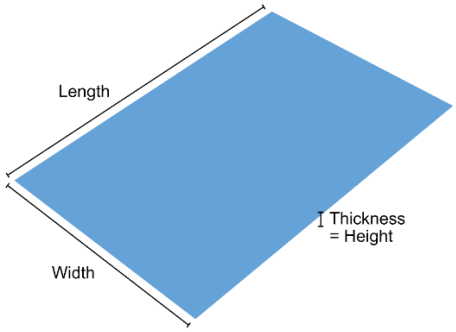


Figure 19: Dimensions 2D packaging

Rigid/ 3D packaging (Figure 20)

- Length (=depth): largest dimension of the component horizontally
- Width: maximum depth of the component
- Height: largest dimension of the component in height/vertically

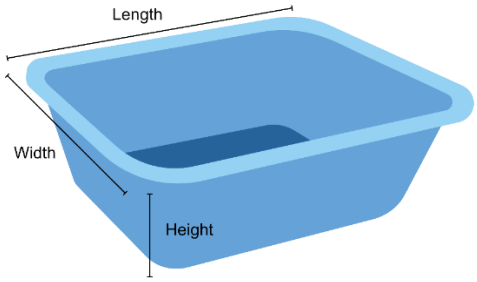


Figure 20: Dimensions 3D packaging

Bottles/ cylindrical packages (Figure 21)

- Height: largest dimension of the component in height/vertically
- Width AND length (=depth): largest diameter of the component

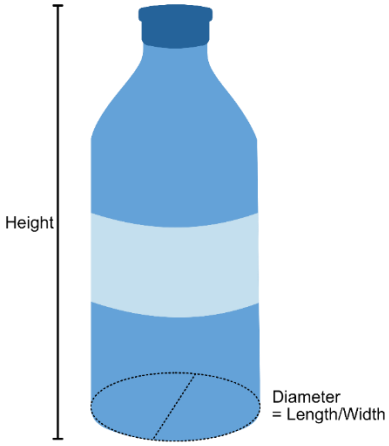


Figure 21: Dimensions bottles and cylindrical packaging

Then the material layers (one or more) of the main body are specified. The order of entry corresponds to the structure of the layers from the outside to the inside, but this order can be changed later, by using the arrow buttons (Figure 22).

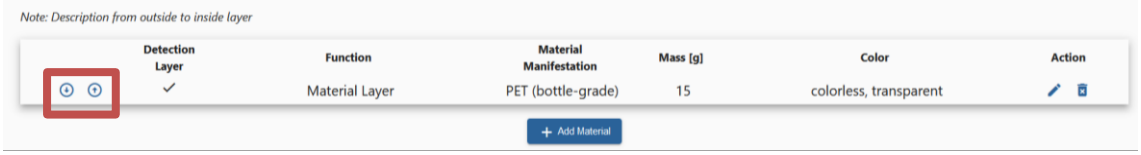


Figure 22: Order of material layers

When no material layer has been added, a red exclamation mark next to the pencil symbol in the "Actions" area appears. This indicates that no material has yet been added and that this is required (Figure 23). Once the main material has been added, this exclamation mark will disappear.

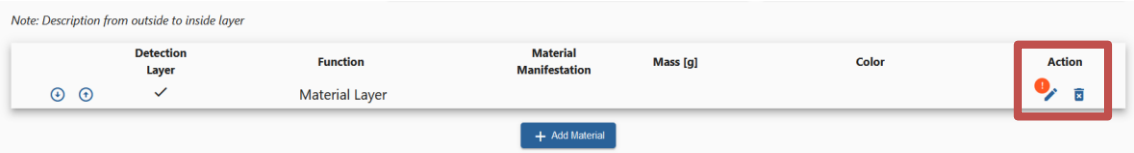


Figure 23: Action required

A material layer can be added by clicking on the pencil icon or on the "+ Add Material" button. A new window opens (Figure 24), in which material specifications can be filled out. It is possible to choose different layer functions:

- Material Layer
- Barrier Layer
- Sealing
- Vapor-Deposited Barrier
- Printing/ Ink
- Adhesive

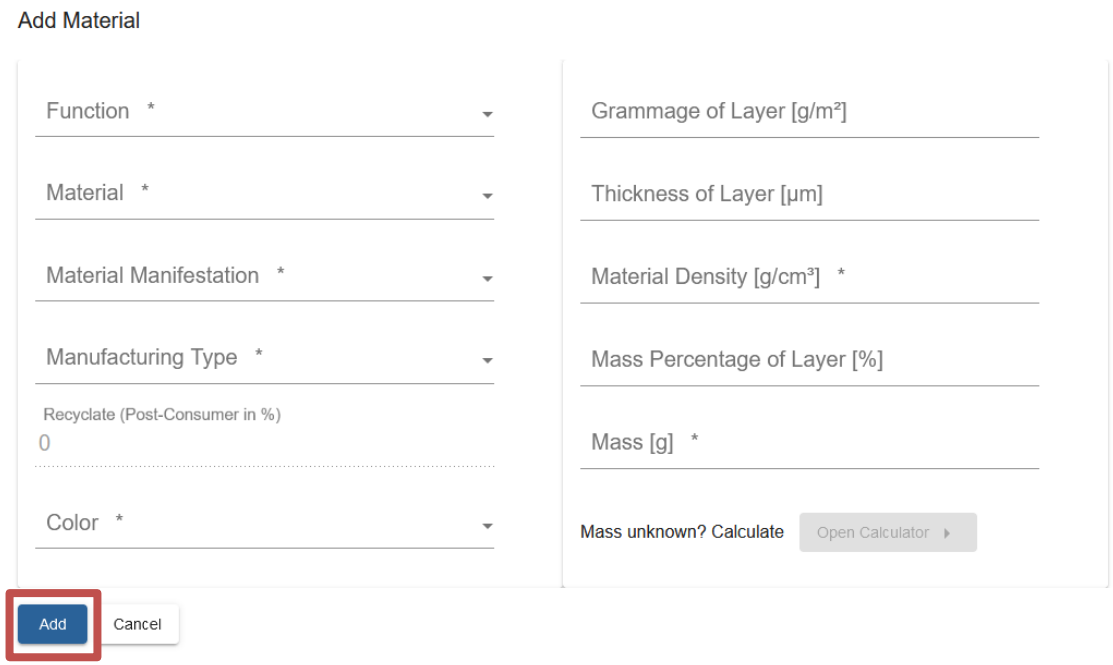


Figure 24: Add Material

Then the material, the material manifestation, the manufacturing process, and the color of the material can be selected from a drop-down menu. The mass of the material layer must be given in grams (g) and the recyclate content in percent (%). The entry is automatically saved by clicking on "Add" for new layers or "Edit" for already existing layers (Figure 24).
For packaging units that consist of several materials, all other material layers can be entered under "+ Add material" (Figure 25).

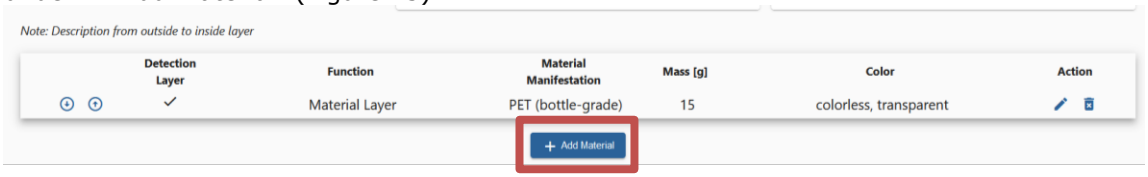


Figure 25: Add Additional Layers

3.2.2. Packaging Components

Additional packaging components such as closures, decorations, or packaging aids can either be added manually or imported from your list of already saved components (Figure 26).

Figure 26: Add or Import new Component

When importing components from your own datasets, a window will open with all available components or the selected type (Figure 27). These can be inserted "with tracking" or "without tracking" (as explained in section 11.4.2).
One or more packaging components can be inserted at once.

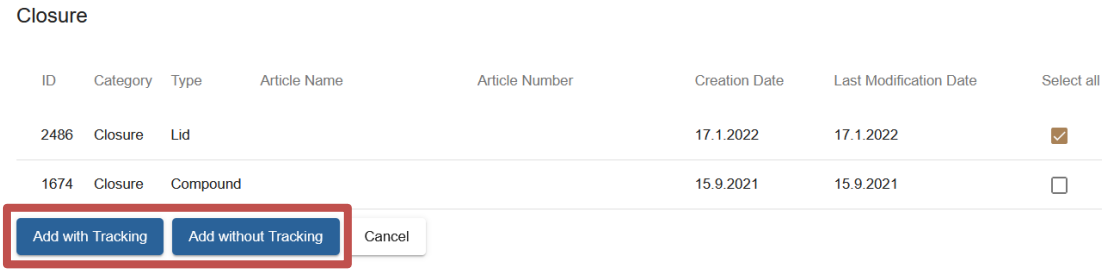


Figure 27: Import Component

3.2.2.1. Closure

To enter a new closure "+ Add Closure" must be selected, and a new window opens (Figure 28).

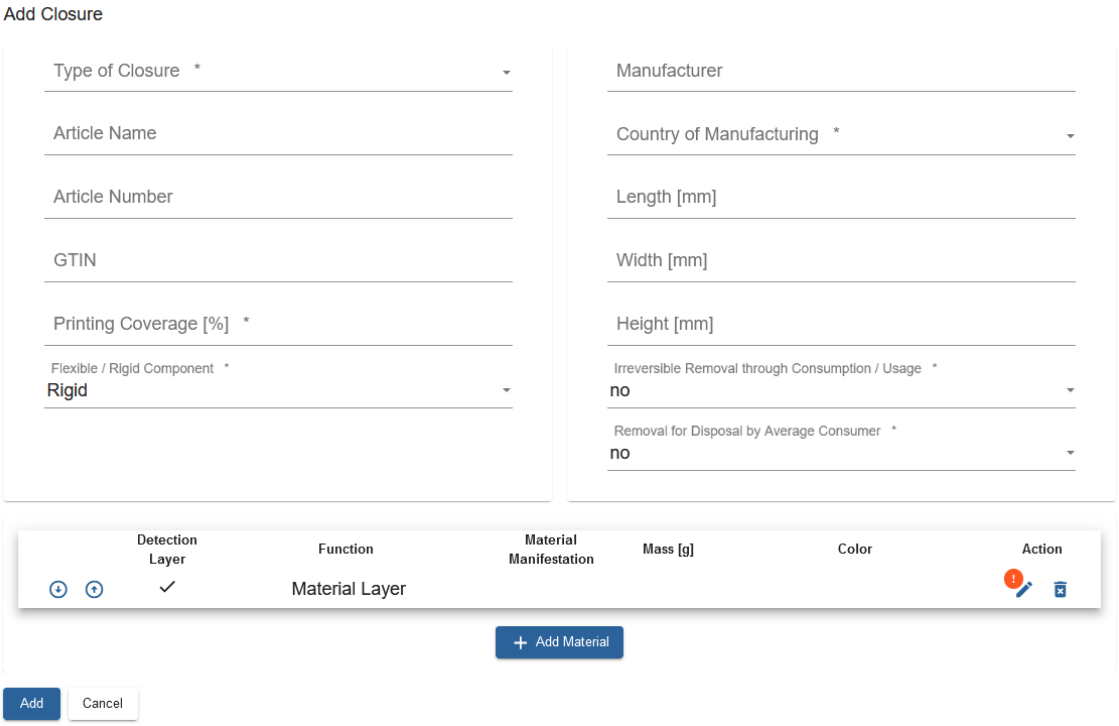
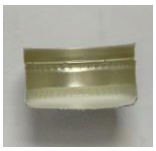


Figure 28: Add closure

The type of closure must be specified. Descriptions of the closure types which can be selected are listed in Table 1.

Name	**Explanation**	**Example**
Compound	Sealing layer in metallic screw caps	
Cork	Bottle stopper made of cork or polymer	
Disc Top Cap	Cap with integrated disc with opening for viscous products; The pane opens when you press on the finger rest	

Film	Flexible Closure	
Flip-Top Cap	Cap with lid fastened by a hinge; Opening in cap for product flow	
Lid	Flexible closure for cups	
Other	All other closures	
Press-On Twist-Off	Metal cap with polymer gasket lining for vacuum closing glass jars	

Name	**Explanation**	**Example**
Screw Cap	Threaded screw cap; Not under vacuum	
Sealing	Gasket or sealing (layer)	
Snap- On Lid	Round lid for jars, cans etc.; Closure by clamping force	
Tear and Open Strip / Pull Strip	Thread for simplified opening of non-tear-resistant materials	

Table 1: Types of Closures

It must be indicated whether the packaging component is disposed of separately (Figure 29).

- "Irreversible removal through consumption/usage" is to be indicated with "yes" if the removal of the component is necessary for the consumption of the product and cannot be reattached to the packaging.
- If this is answered with "no", the customer involvement is queried.
- If the component is provided with perforation and removal instructions, "Separate disposal by typical customer" is to be indicated with "yes". Otherwise, "no" must be selected.

The legal basis for the latter specification may differ from country to country and can thus lead to different calculation results per country.

Figure 29: Removability Conditions

Subsequently, the input of the materials is identical to the input of the materials of the main body.

After completing the input, a packaging component can be exported from the packaging unit and saved. This can be done under "Action" by clicking on the save symbol (Figure 30).

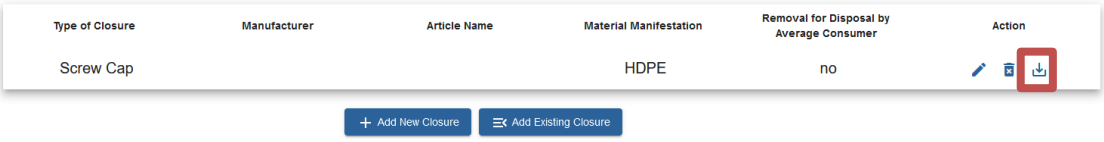


Figure 30: Save Component

A window opens in which the desired destination folder of the component must be selected (Figure 31). Click on "Select" to define the folder and save the component. The saved closure can now be found under "Components" in the start menu or data management.

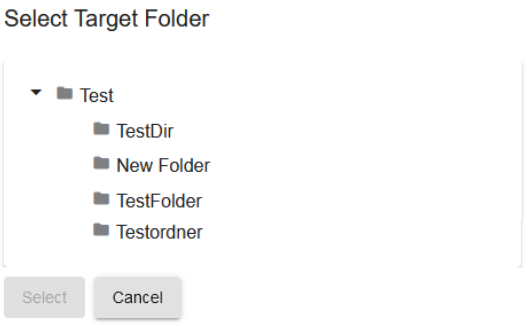


Figure 31: Select Component Folder

3.2.2.2. Decoration

Click on "+ Add Decoration" to open the "Add Decoration" window (Figure 32).

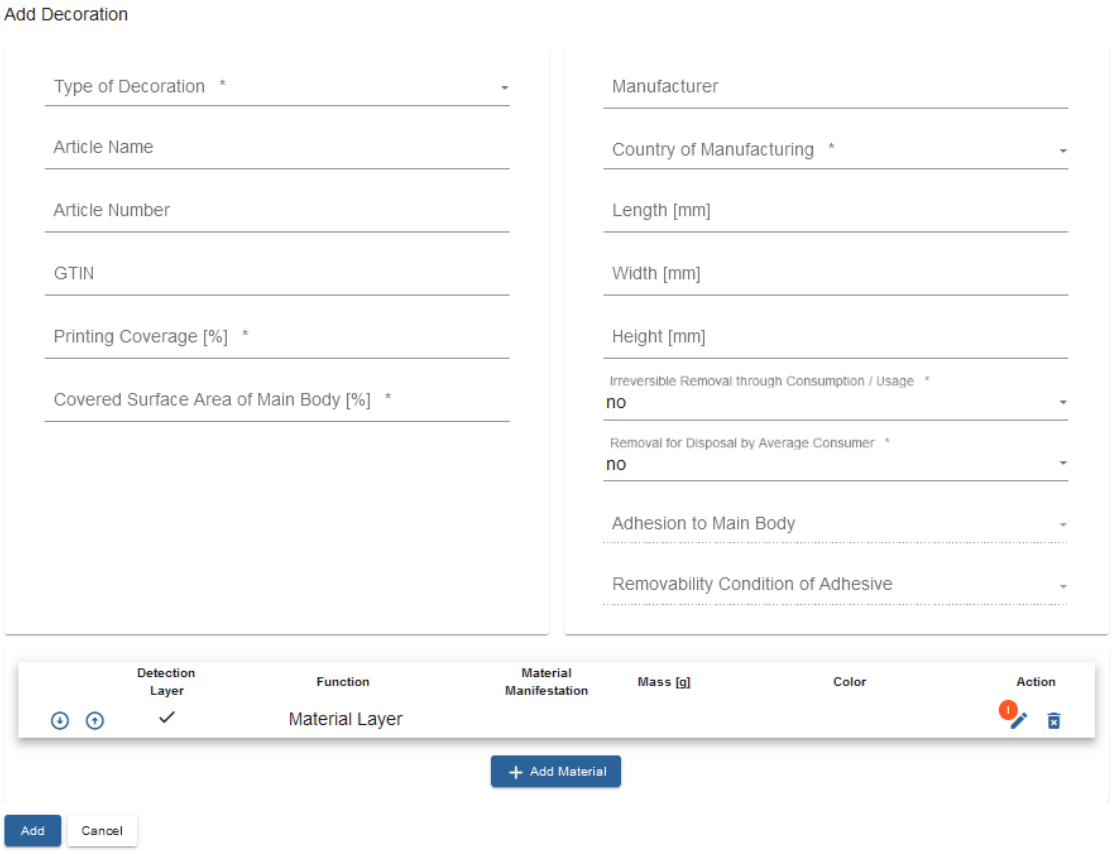


Figure 32: Add Decoration

Under "Type of Decoration", you can choose between the following options:

- Banderole
- Label
- In-Mold Label
- Sleeve
- Wrap

Under the item "Printing Coverage" the printed area of the decoration must be indicated in percent (%). In the field "Covered surface area of the main body" it must be indicated how much percentage (%) of surface of the main body is covered by the decoration (Figure 33).

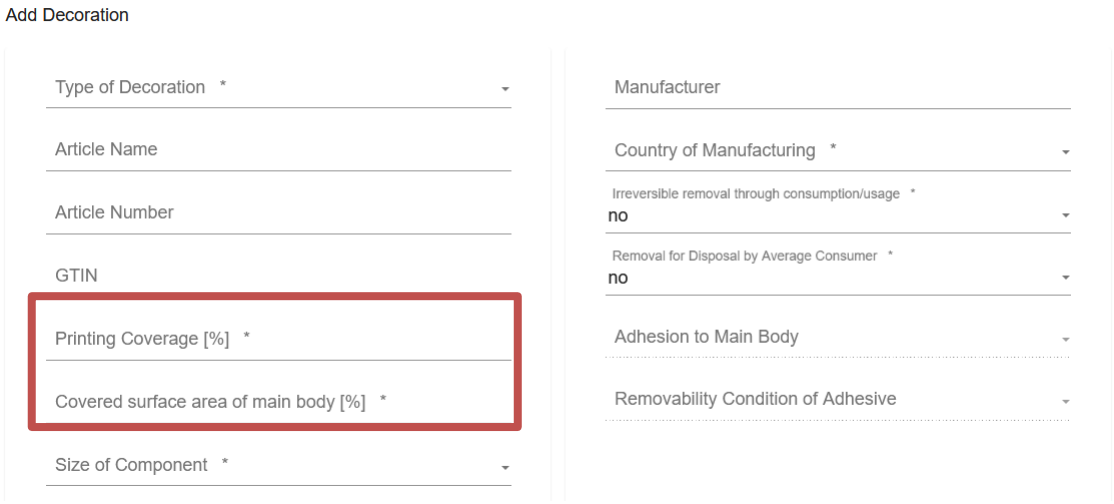


Figure 33: Printing and Main Body Coverage

For the decoration, as for the closure, the separate removal by the consumer is asked. In addition, it must be stated whether the decoration is glued to the main body and whether, and under which conditions, the adhesive is soluble (Figure 34).

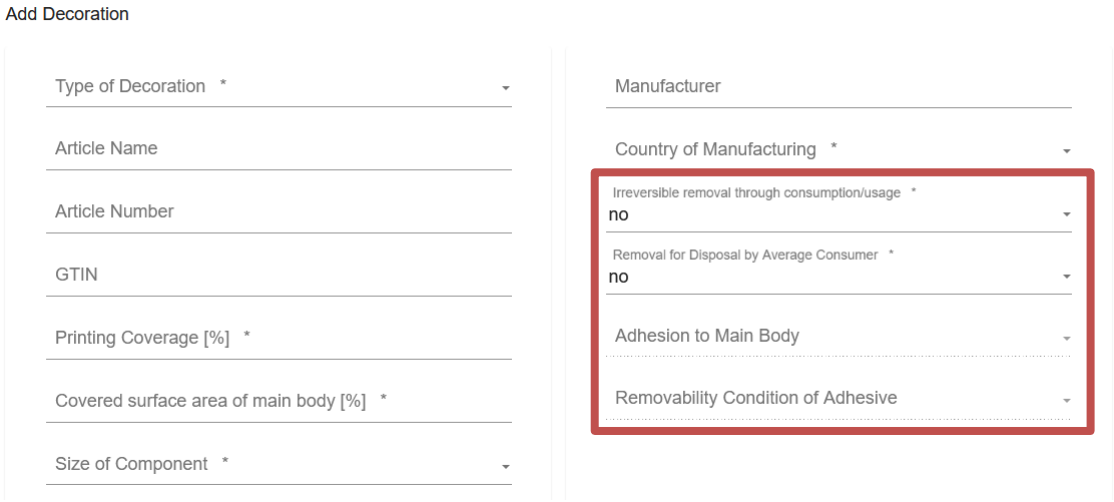


Figure 34: Removability and Adhesive

The input of the materials is identical to the input of the materials for main body and closure.

3.2.2.3. Packaging Aids und Inlays

Under "+ Add New Inlay" and "+ Add New Packing Aid" inlays and other additional components can be added. The entries are at par to the closure and decoration entries (Figure 35).

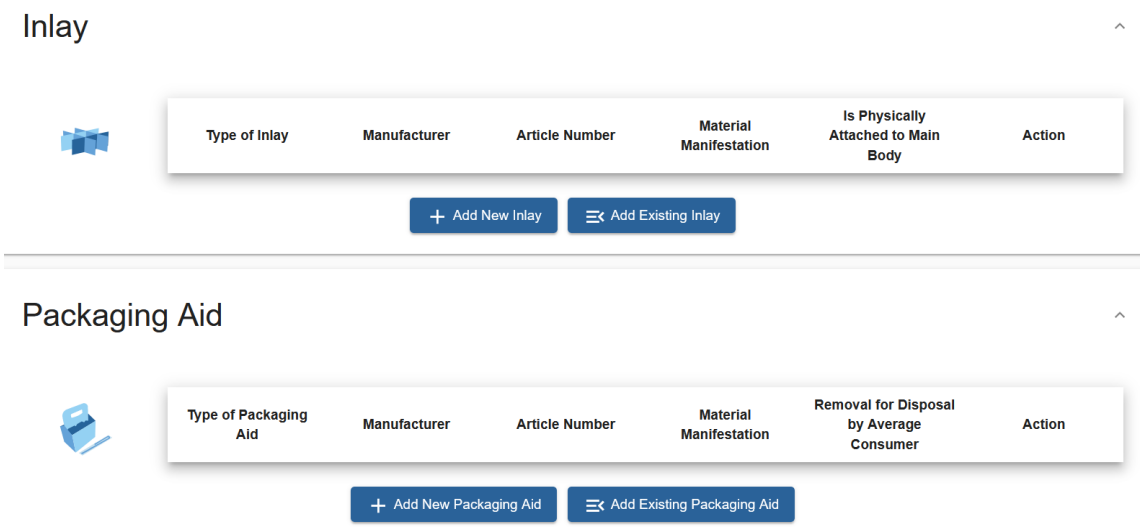


Figure 35: Packaging Aids and Inlays

3.2.3. Tags

To each dataset (systems, units, components, material layers) tags can be assigned (Figure 36).

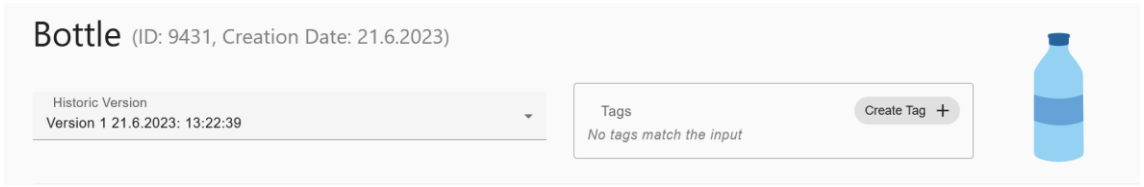


Figure 36: Tags

Tags can be created and managed in “Data Management” (Figure 37). When creating a tag, a color and a name for the tag can be assigned, and a description for the tag can be written (Figure 38). Tags are completely individual and allow the user to group packaging data according to, for example, projects, customer groups, development status, or other categories.

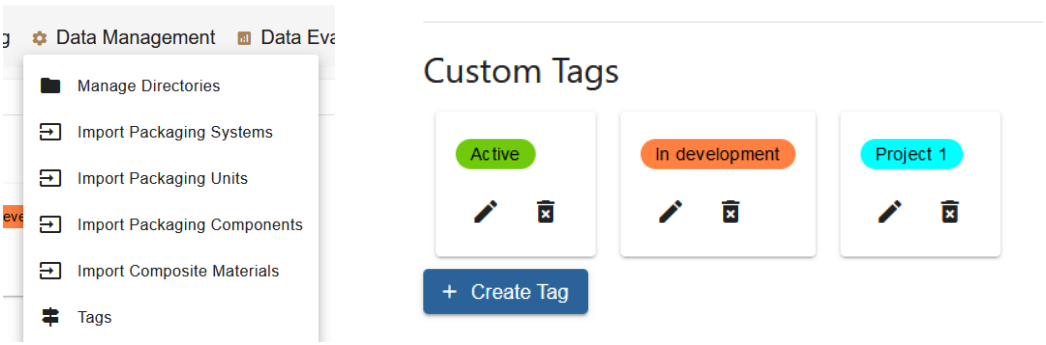


Figure 37: Tags – Overview

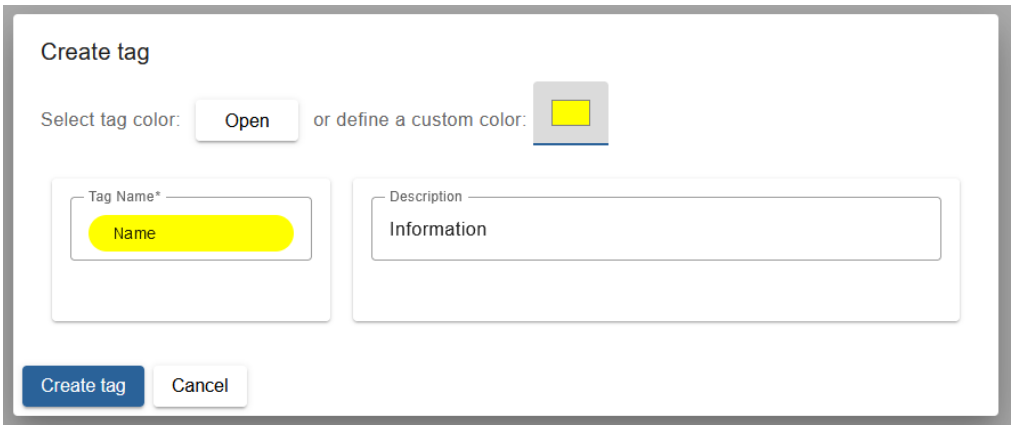


Figure 38: Creating Tags

3.2.4. Saving a Packaging Unit

After all entries have been completed, the packaging unit must be saved before evaluations can be carried out. Files are saved with version numbers. When creating a new file, version 1 is automatically created.
The current version is automatically displayed under the ID when the packaging unit, component, or system is opened (Figure 39 A). Previous versions can be displayed and loaded by clicking on the version, but they cannot be edited (Figure 39 B).

Figure 39: Versions

When saving changes in a unit, component, or system, either a new version of the file can be created or the old version can be overwritten (Figure 40).
If a version is overwritten, all calculations which have been carried out for this version are deleted to eliminate data inaccuracies.

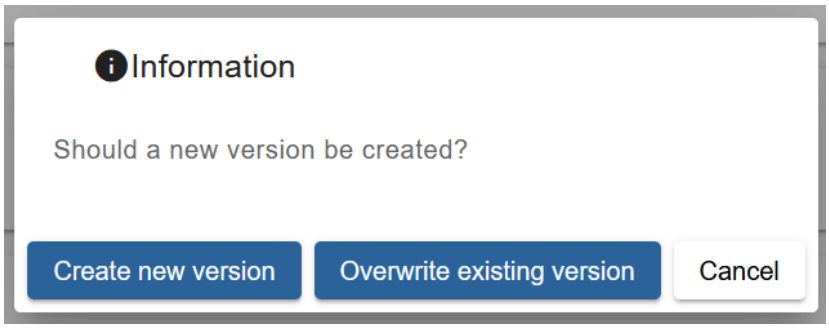


Figure 40: Saving changes

Versions can be given names to simplify identification (Figure 41).

Figure 41: Naming Versions

After the packaging unit has been saved, analyses can be carried out.

3.3. Example: Type Bag, Film, Pouch

For flexible packaging types, the entries for packaging information, filling material, manufacturing information as well as the uploading of pictures are identical to the example "Bottle".

Many flexible packaging types are made up of multiple material layers. If the packaging consists of several layers, they must be entered one after the other, from the outside to the inside. By clicking on "+ Add Material" another layer can be entered (Figure 42).

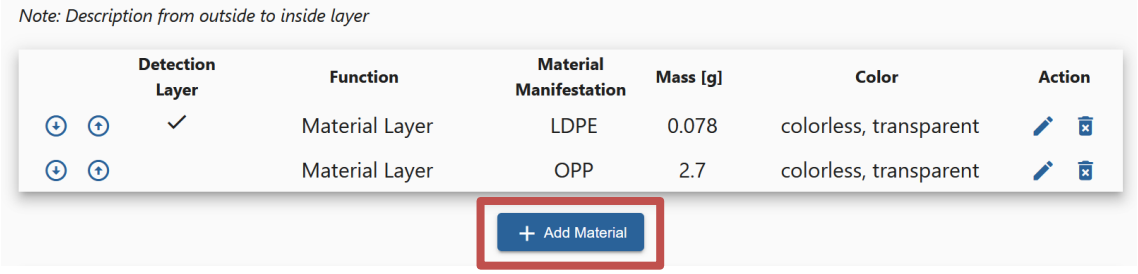


Figure 42: Adding Additional Layers

The order of the material layers can be changed later using the arrow symbols (Figure 43).

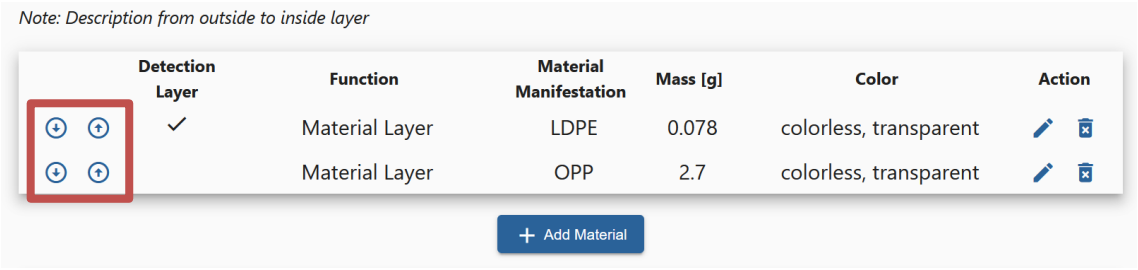


Figure 43: Changing Layer Order

3.3.1. Mass Calculator

For multi-layer films, the material weight of the individual layers is often not known. The input is therefore either the weight, the grammage, or the thickness of the layers.

3.3.1.1. Weight of the Material Layers Known

If the weight of the material layer is known, it can be entered in the "Mass" field (Figure 44).

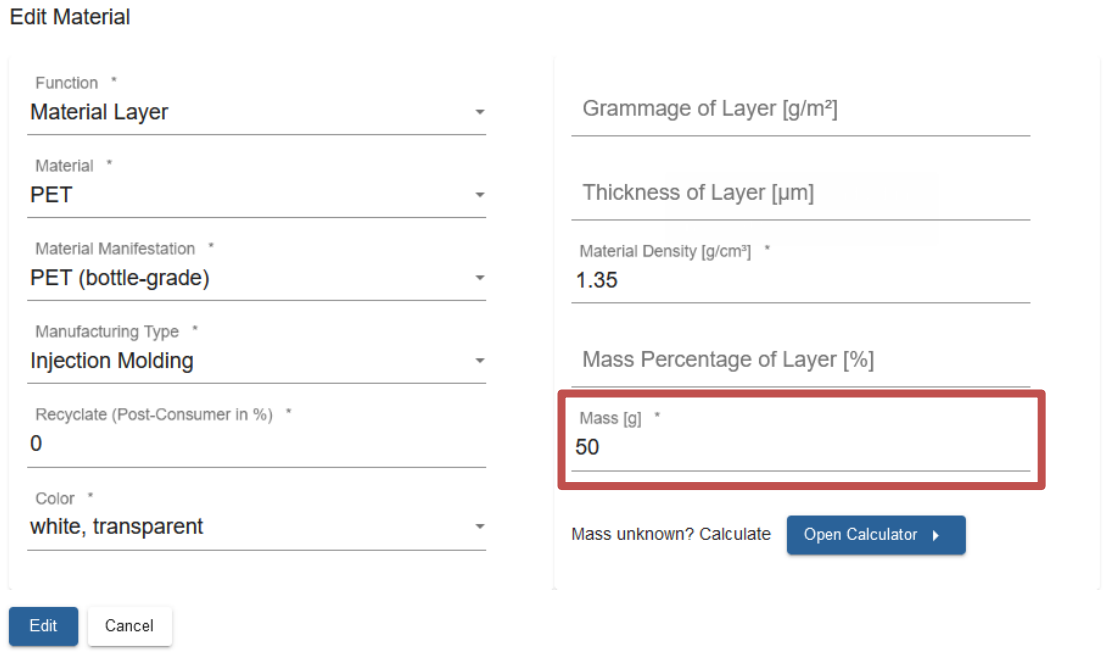


Figure 44: Entry of Layer Mass

3.3.1.2. Weight of the Material Layers Unknown

If the weights of the individual material layers are not known, they can be calculated via the grammage or thickness of the layers and the total mass and grammage of the film with the mass calculator (Figure 45).

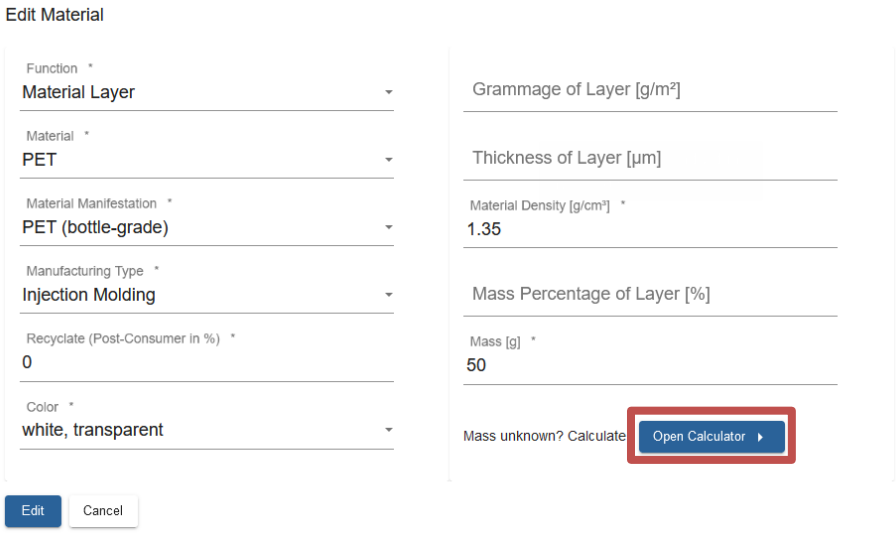


Figure 45: Open Mass Calculator

In the mass calculator, the total mass and the total grammage must be entered (Figure 46). This information is then used to calculate the mass of the layer.

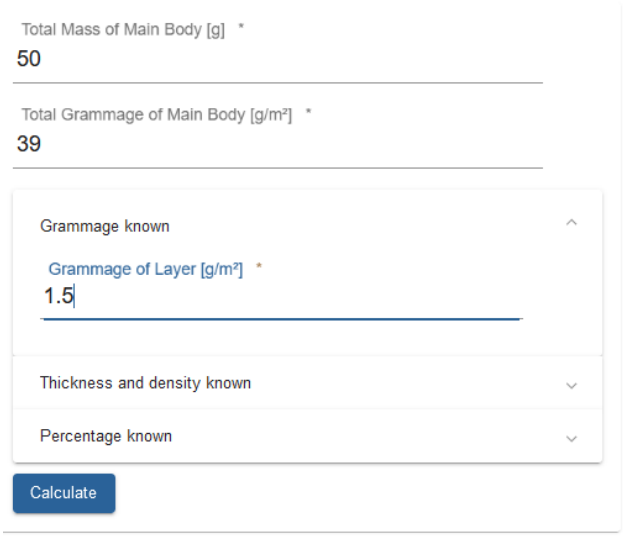


Figure 46: Total Mass and Grammage

Then either the grammage (Figure 47 A) or the thickness of the layer can be entered (Figure 47 B). If the layer thickness is entered, the grammage is calculated via the density. This is stored for all materials but can be changed manually.

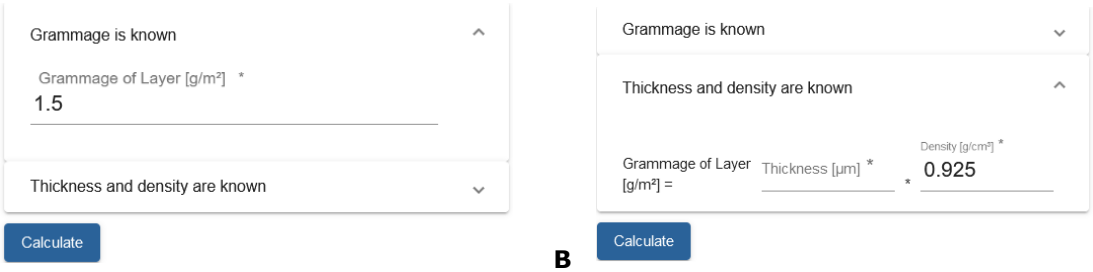


Figure 47: Entering Layer Grammage or Thickness

By clicking on "Calculate" the mass of the layer is calculated and appears in the field "Mass".

4. Creating Packaging Components

4.1. Packaging Components

The following packaging components can be created in the Packaging Cockpit:

- Main Body - Closure - Decoration - Inlay - Other Packaging Aid

Components can be created as part of a packaging unit (section 3.2.2) or they can be created individually. The packaging component interface is similar to that of packaging units (Figure 48). Packaging components can be saved, managed, exported/imported, and integrated into packaging units. Reports can be generated for packaging component specifications, to share and manage this data outside of the Packaging Cockpit.

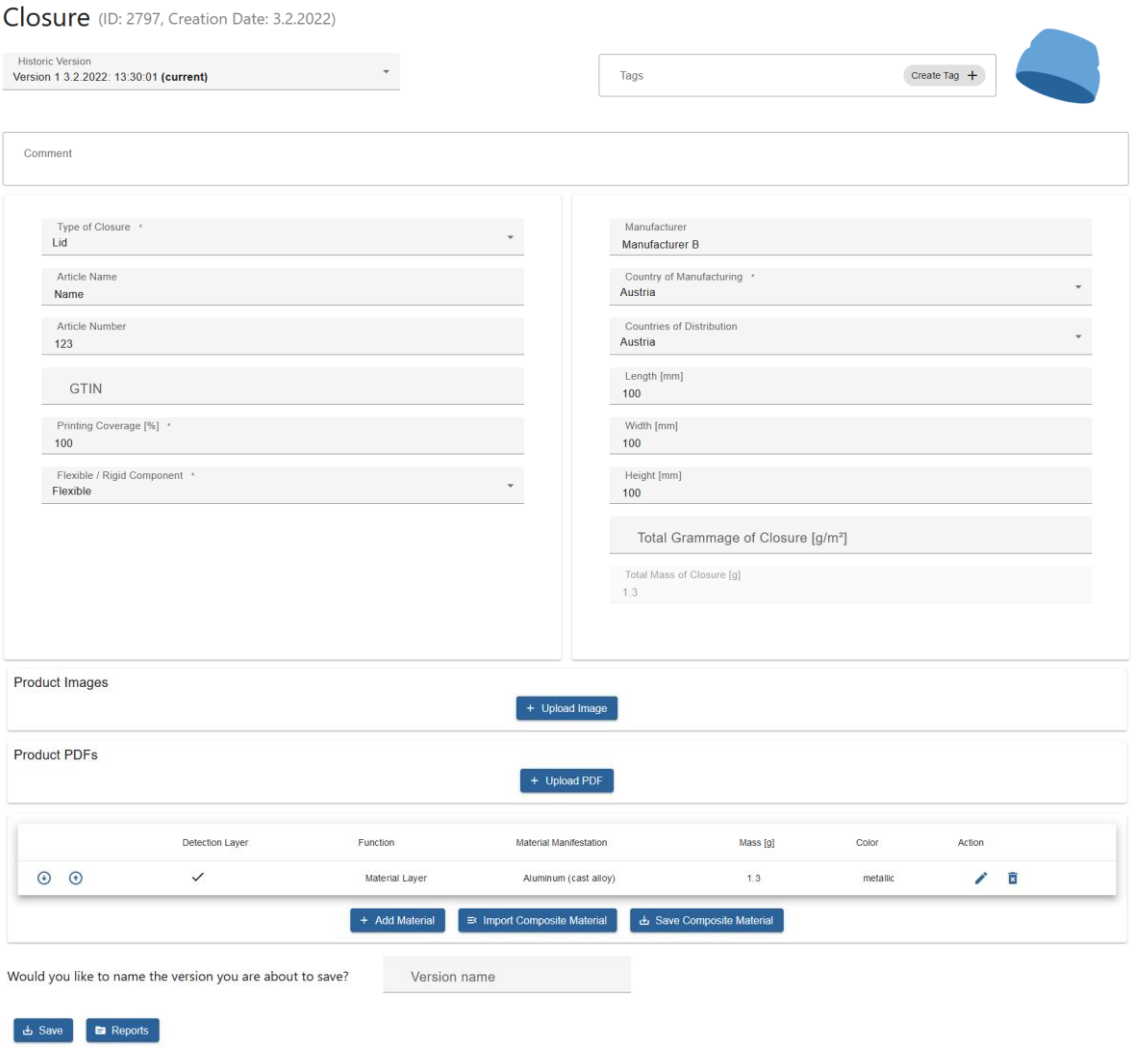


Figure 48: Creating a packaging component

5. Creating Packaging Systems

In addition to packaging units, components and materials, the packaging systems level is now available. This is available both on the start page (Figure 49) and in data management (Figure 50).

Figure 49:Start page - packaging systems

Figure 50: Data management – packaging systems

After clicking "+ Add new packaging system" (Figure 51) a new page opens, where all necessary information about the system can be filled out.

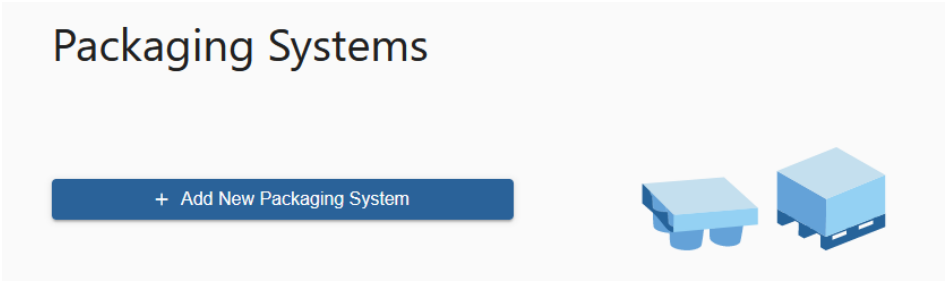


Figure 51: Adding a new packaging system

The basic information data entry for packaging systems is similar to the basic packaging unit information (Figure 52).

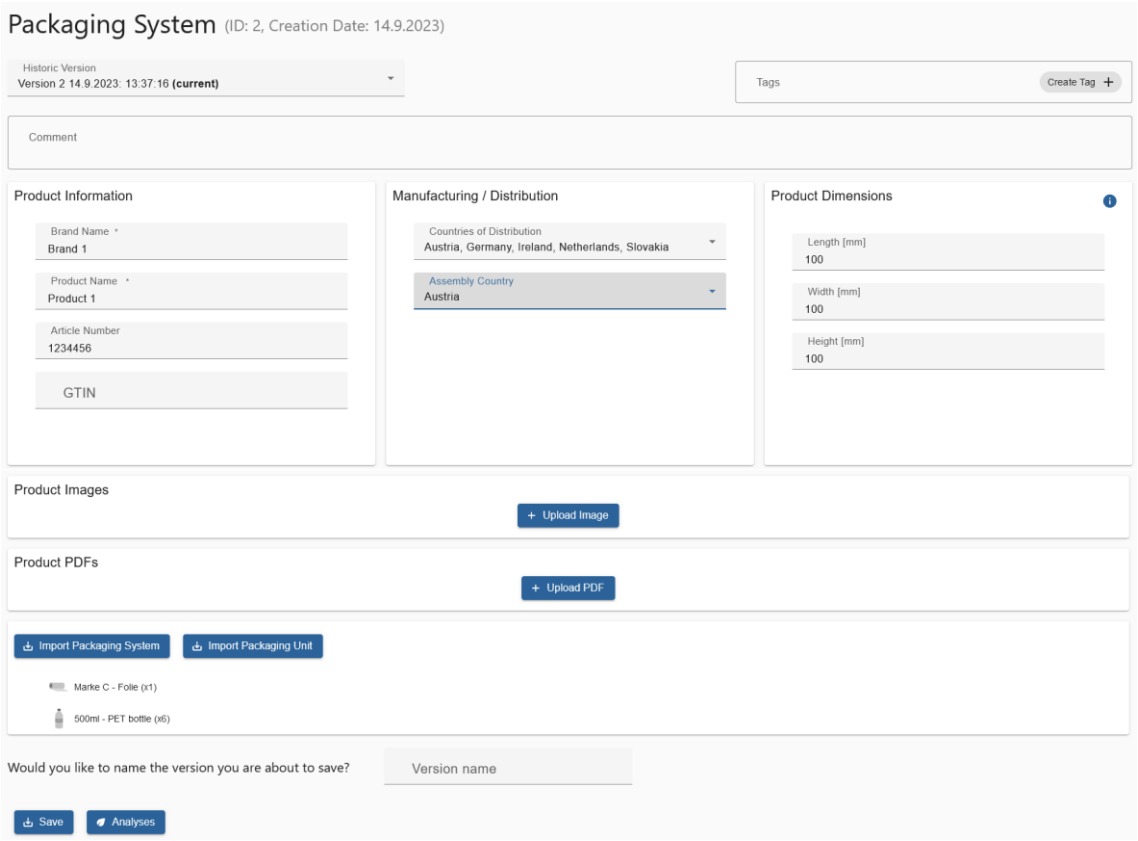


Figure 52: Packaging system information input

In the packaging systems level, packaging units and systems can be imported. The structure of a packaging system is hierarchical (Figure 53). Each level of a packaging system can be assigned a quantity. In this way, for example, multipacks, can be created.

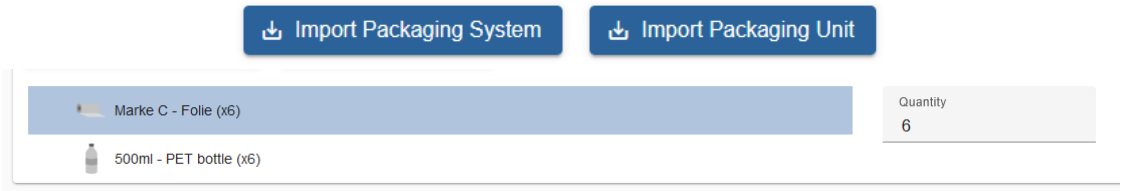


Figure 53: Importing packaging units and systems in a packaging system

The information of the underlying packaging systems and units imported into the parent packaging system is displayed, when clicking on the respective levels (Figure 54). However, this information can only be viewed and not edited within the packaging system. To edit this information, the respective parent dataset must be opened.

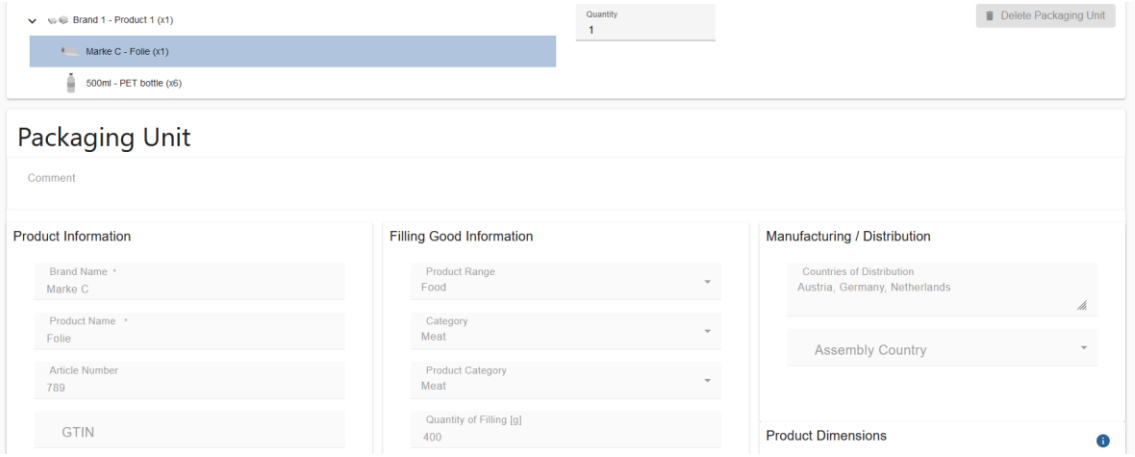


Figure 54: Displaying information of integrated packaging systems and units within a packaging system

6. Analyses

After saving a packaging unit or system, an analysis can be carried out. The analyses can be called up either directly next to the save button (Figure 55) or on the start page by clicking on the green leaf symbol (Figure 56).

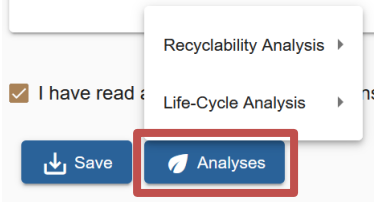


Figure 55: Analyses 1

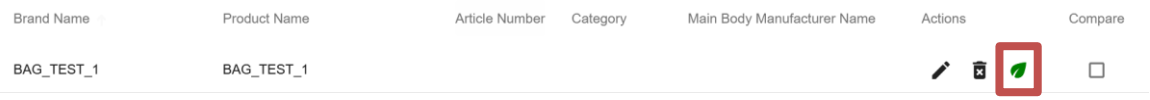


Figure 56: Analyses 2

Analyses can only be carried out if all necessary fields are filled in. If this is not the case, a warning appears and the fields to be filled in are highlighted in red (Figure 57).

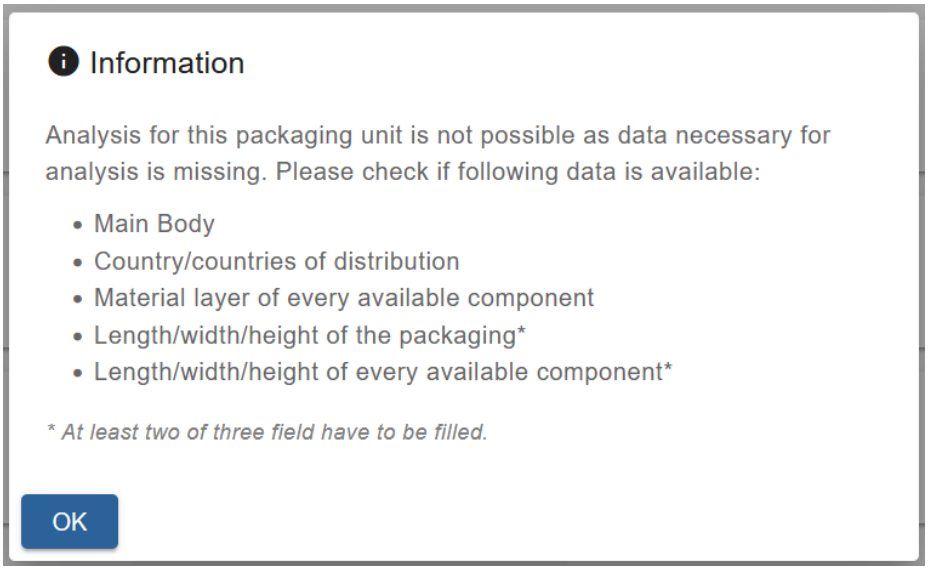


Figure 57: Required fields for calculation

6.1. Recyclability Analyses

The recyclability analysis indicates the recyclability in percent (%) for each distribution country selected for the packaging unit or system.

Definition of Recyclability:

Recyclability of packaging is assessed by the packaging specifications. Based on these, it is assessed whether the disposal unit -the condition of the packaging at disposal (adherent components, material composition, etc.)- can be assigned to a material stream. To be considered recyclable, packaging must meet the following criteria:

- In the chosen country, a **collection infrastructure** for the material in question is in place.
- The material **can be sorted** into one of the predefined material streams in place in the chosen country with state-of-the-art sorting infrastructure and procedures.
- Within a material recycling process, the **recyclate** of the material can be gathered.
- The obtained recyclate has **market potential** and could further be used as a replacement for material identical virgin material applications.

6.1.1. Analysis Map

When calculating the recyclability of a packaging unit or system, the result is first displayed as a country overview, showing the recyclability grades for each country in which a calculation has been carried out (Figure 58). The performance grades displayed are generated under Design for Recycling criteria in accordance with the Proposal of the EU Packaging and Packaging Waste Regulation.

Figure 58: Recyclability Map

6.1.2. Recyclability Analysis of a Packaging Unit

The recyclability of the entire packaging unit is shown in percentage (%) as a pie chart (Figure 59). Above the diagram, the percentage (%) of recyclability or non-recyclability of the entire packaging unit is stated. The pie chart reflects the recyclability of the entire packaging unit.

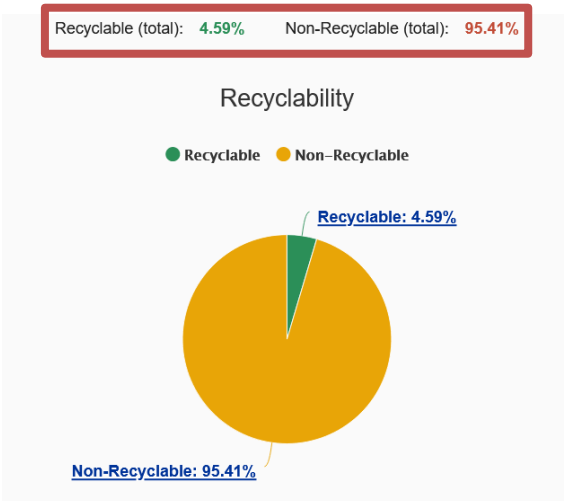


Figure 59: Results of the Recyclability Analysis

When clicking on the individual sections of the pie chart, it is possible to drill down into the specific section and display all materials and their respective percentages (%) (Figure 60).

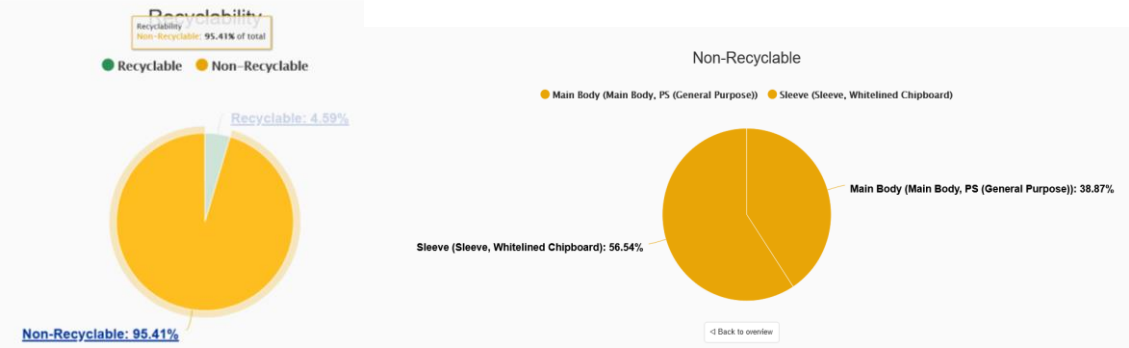


Figure 60: Drill down

Below the diagram is a list of the evaluation of all materials used and an overview of the overall recyclability of the packaging and its components in percent (%) (Figure 61).

Component	Material	Color	Mass [g]	Rating
Main Body (Main Body)	PS (General Purpose)	white, opaque	11	C
Closure (Lid)	Aluminum (Cast Alloy)	metallic	1.3	A
Decoration (Sleeve)	Whitelined Chipboard	white, opaque	16	C

Rating Name	Rating Percentage [%]	Component	Component Percentage [%]
Recyclable	4.59	Closure (Lid, Aluminum (Cast Alloy))	4.59
		Main Body (Main Body, PS (General Purpose))	38.87
Non-Recyclable	95.41	Sleeve (Sleeve, Whitelined Chipboard)	56.54

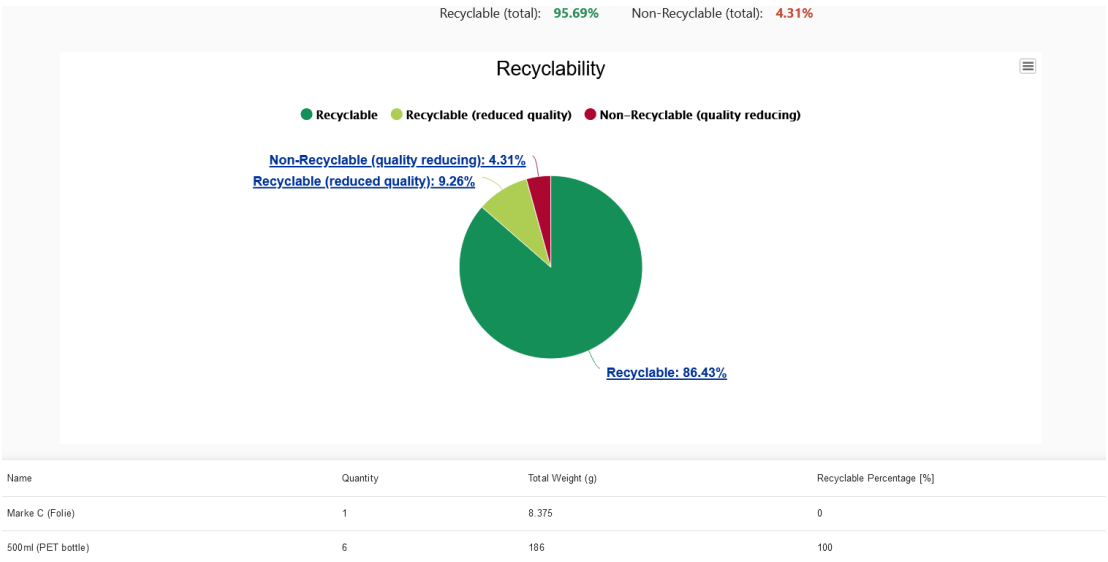
Figure 61: Overview of results

In the upper area of the recyclability analysis, it is possible to switch between the indicated countries of distribution (Figure 62). As the recyclability is based on existing regulations, collection and sorting infrastructures, it can vary from country to country.

Figure 62: Analysis display of individual countries

6.1.3. Recyclability Analysis of a Packaging System

The calculation of the recyclability of a packaging system is congruent with the calculation for packaging units.

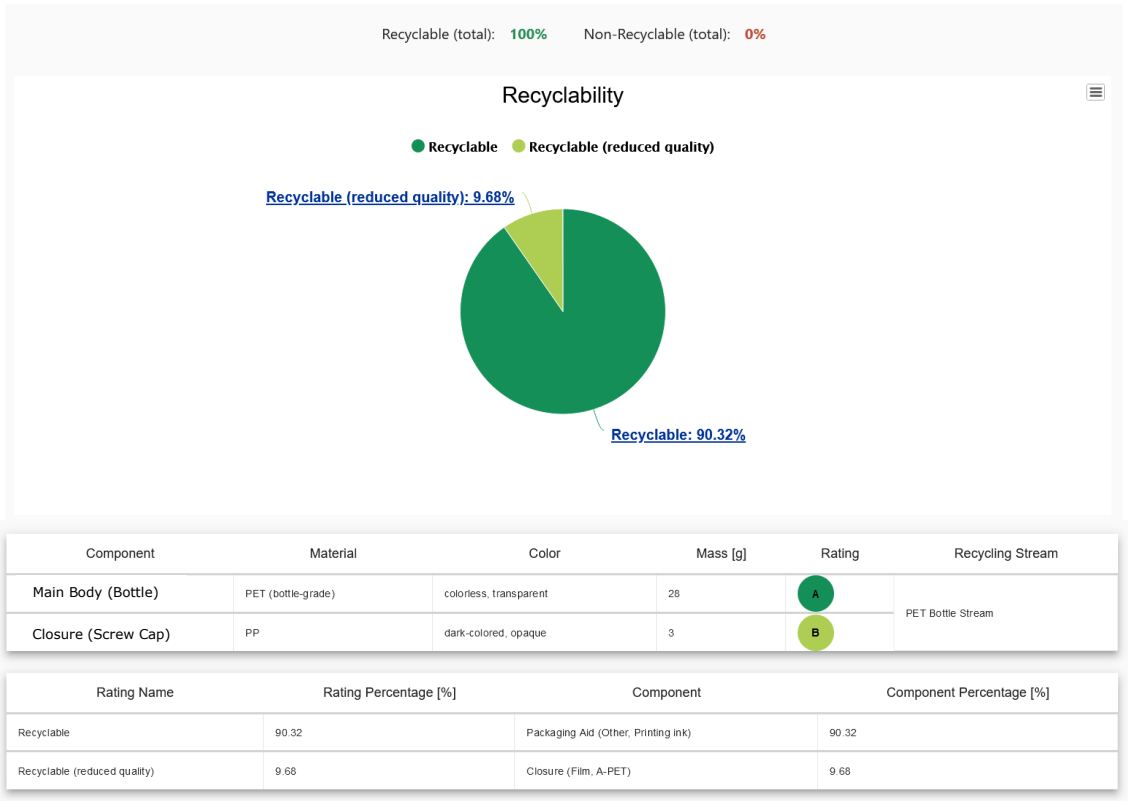


Name	Quantity	Total Weight (g)	Recyclable Percentage [%]
Marke C (Folie)	1	8.375	0
500 ml (PET bottle)	6	186	100

Figure 63: Results – Level packaging system

The results of the recyclability calculation are displayed at all levels of the packaging system. The packaging system level gives an overview of all underlying systems and units (Figure

63) and the packaging unit level shows the results in the same way as for a packaging unit calculation (Figure 64).



Component	Material	Color	Mass [g]	Rating	Recycling Stream
Main Body (Bottle)	PET (bottle-grade)	colorless, transparent	28	A	PET Bottle Stream
Closure (Screw Cap)	PP	dark-colored, opaque	3	B	

Rating Name	Rating Percentage [%]	Component	Component Percentage [%]
Recyclable	90.32	Packaging Aid (Other, Printing ink)	90.32
Recyclable (reduced quality)	9.68	Closure (Film, A-PET)	9.68

Figure 64: Results – Level packaging unit

6.2. Life Cycle Analysis

Additional to the recyclability analysis, a life cycle analysis (LCA) can be calculated. After saving the packaging unit or system, an LCA can be calculated by clicking on "Analyses" (Figure 65).

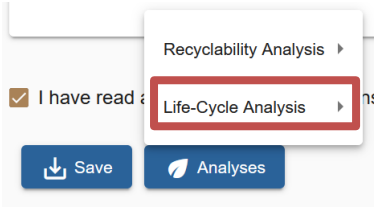


Figure 65: Calculate a Life Cycle Analysis

The life cycle assessment is presented as separate bar charts for the respective impact categories (Figure 66).

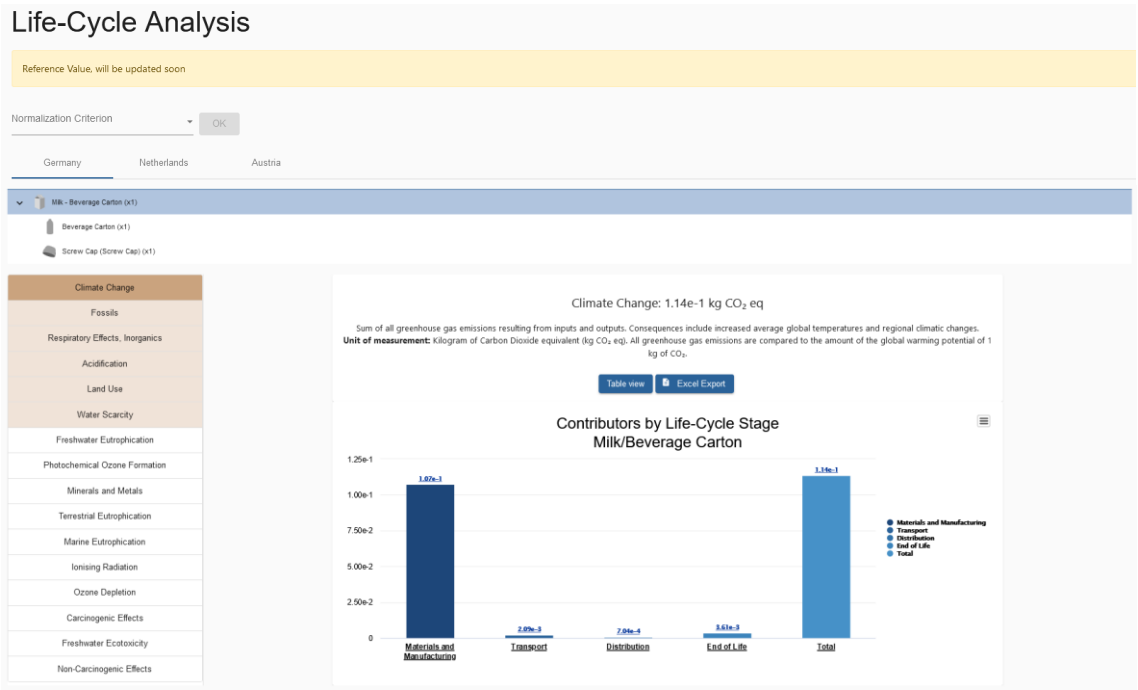


Figure 66: Results of the Life Cycle Assessment

In addition to the diagram, it is possible to display the values in tabular form. By clicking on the button "Table view", which is located below the list of impact categories, a table opens with the values of all impact categories in all life cycle phases of the packaging unit (Figure 67).

Table view

Life-Cycle stage	Materials and Manufacturing	Transport	Distribution	End of Life	Total	Impact [%]
Climate Change [kg CO2 eq]	1.0719e-1	2.0906e-3	7.0400e-4	3.6078e-3	1.1359e-1	31.20%
Fossils [MJ]	1.4346e+0	3.2464e-2	1.0932e-2	-1.7977e-1	1.2983e+0	17.04%
Respiratory Effects, Inorganics [disease incidence]	8.5971e-9	1.8788e-10	6.3267e-11	-1.9789e-10	8.6503e-9	12.45%
Acidification [mol H+ eq]	7.1981e-4	1.5311e-5	5.1559e-6	-2.5228e-5	7.1504e-4	8.22%
Land Use [points]	1.3415e+1	5.6639e-2	1.9073e-2	-9.6942e-1	1.2521e+1	7.61%
Water Scarcity [m³ Water-Eq]	7.8360e-2	1.2962e-4	4.3651e-5	-1.3045e-3	7.7229e-2	5.83%
Freshwater Eutrophication [g P eq]	5.5376e-5	1.3009e-7	4.3806e-8	-9.6687e-6	4.5881e-5	5.10%
Photochemical Ozone Formation [g NMVOC eq]	3.4233e-4	9.2786e-6	3.1246e-6	-7.9756e-6	3.4676e-4	4.18%
Minerals and Metals [g Sb eq]	3.1328e-7	4.7890e-9	1.6127e-9	-2.0115e-8	2.9957e-7	4.02%
Terrestrial Eutrophication [mol N eq]	1.1646e-3	2.9010e-5	9.7692e-6	-6.1225e-5	1.1421e-3	2.42%
Marine Eutrophication [g N eq]	1.1839e-4	2.6247e-6	8.8388e-7	-2.9725e-6	1.1893e-4	1.26%
Ionising Radiation [kBq U235 eq]	5.9504e-3	1.6485e-4	5.5514e-5	-1.6315e-3	4.5393e-3	0.55%
Ozone Depletion [g CFC-11 eq]	5.0274e-9	4.9962e-10	1.6825e-10	-1.3772e-9	4.3180e-9	0.12%
Carcinogenic Effects [CTUh]	4.9745e-9	2.5096e-11	8.4511e-12	1.2159e-11	5.0202e-9	0.00%
Freshwater Ecotoxicity						

Close

Figure 67: Table View LCA

When moving the mouse over the row names, a description of the impact category or life cycle phase is displayed as a tool tip (Figure 68).

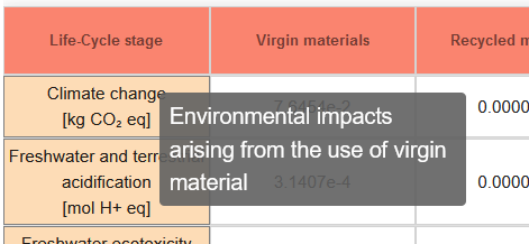


Figure 68: Tool Tip LCA

Background

The Streamlined LCA calculations are based on secondary data from the Ecoinvent database (https://ecoinvent.org/). LCA results are therefore subject to a wider range of variation, which reduces their informative value.

The tool is based on the Product Environmenal Footprint (PEF)[1] standard of the EU and uses the Circular Footprint Formula (CFF)[2].

Raw Materials & Production

In the raw material and production phase, emissions from the extraction and production of the raw material (primary and secondary) as well as emissions from the production of the product are collected.

Transport and Distribution

The "transport" and "distribution" phases include the transport of the packaging from the packaging producer to the retailer/filler, from the retailer/filler to the warehouse and from the warehouse to the store.

Standard distances between different countries are applied.

End of Life (EoL)

The End of Life is currently composed of 3 scenarios, which occur in combination:

- Recycling (mechanical recycling)
- Waste incineration plant (MVA)
- Landfill

Data on material flows and emissions for the respective waste recycling were either taken from the ecoinvent database or modeled based on scientific studies.

The composition of the EoL scenario depends on the outcome of the technical recyclability.

Then, an EoL scenario is compiled based on recycling rates and general waste management quotas.

Interpretation

The results are evaluated in 16 impact categories in accordance with PEF and CFF.

[1] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32021H2279
[2] https://environment.ec.europa.eu/system/files/2021-12/Annexes%201%20to%202.pdf

7. Aggregated Evaluations

Analyses can not only be carried out for single packaging units, but also for several packaging datasets at once, or for your entire packaging portfolio. Aggregated evaluations take into account the quantities of packaging units released onto the market. Thus, before carrying out an aggregated evaluation, quantities have to be entered.

7.1. Quantities

In the Data Management quantities can be entered for packaging units. To do this, one or more datasets must be selected, and "Enter Quantities" must be clicked (Figure 69).

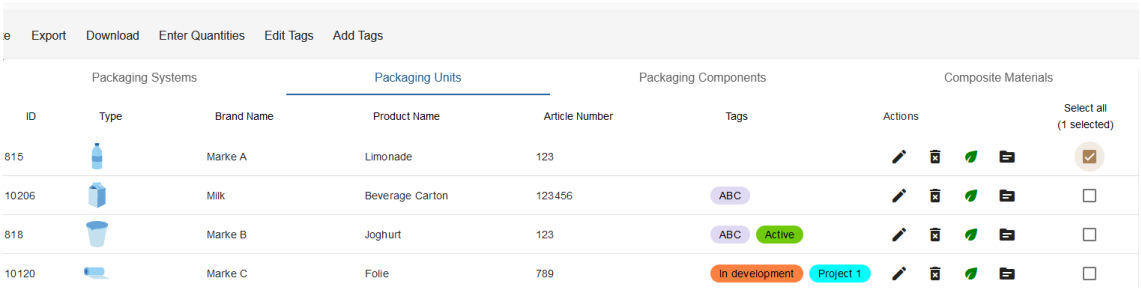


Figure 69: Data Management – Quantities

A pop-up opens, which allows the entry of quantities. If only one dataset has been selected the pop-up looks like this:

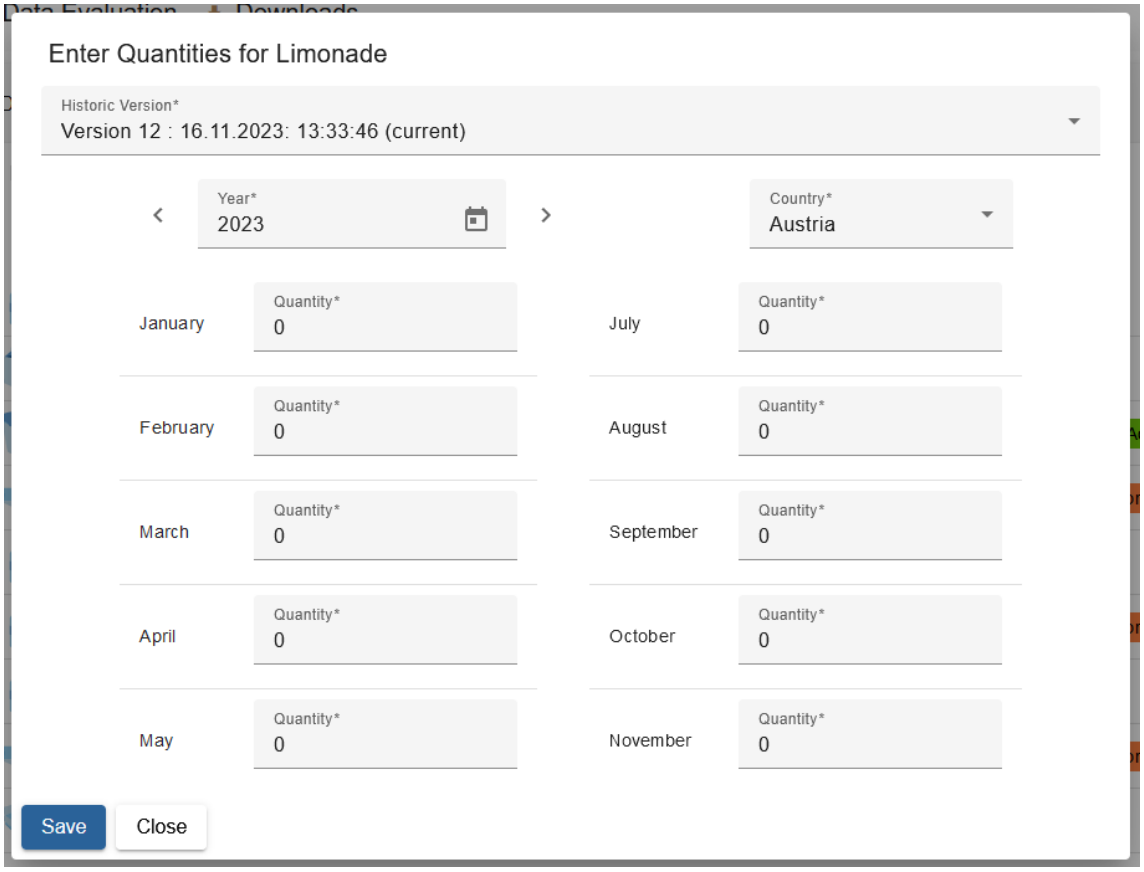


Figure 70: Pop-up quantities single data set

Quantities are entered in pieces by month. The year for which the data is entered can be switched on the top left. Quantities are entered according to country in which the packaging is introduced to the market. Countries can be switched on the top right.

If several packaging datasets are selected, the pop-up, which opens looks like this:

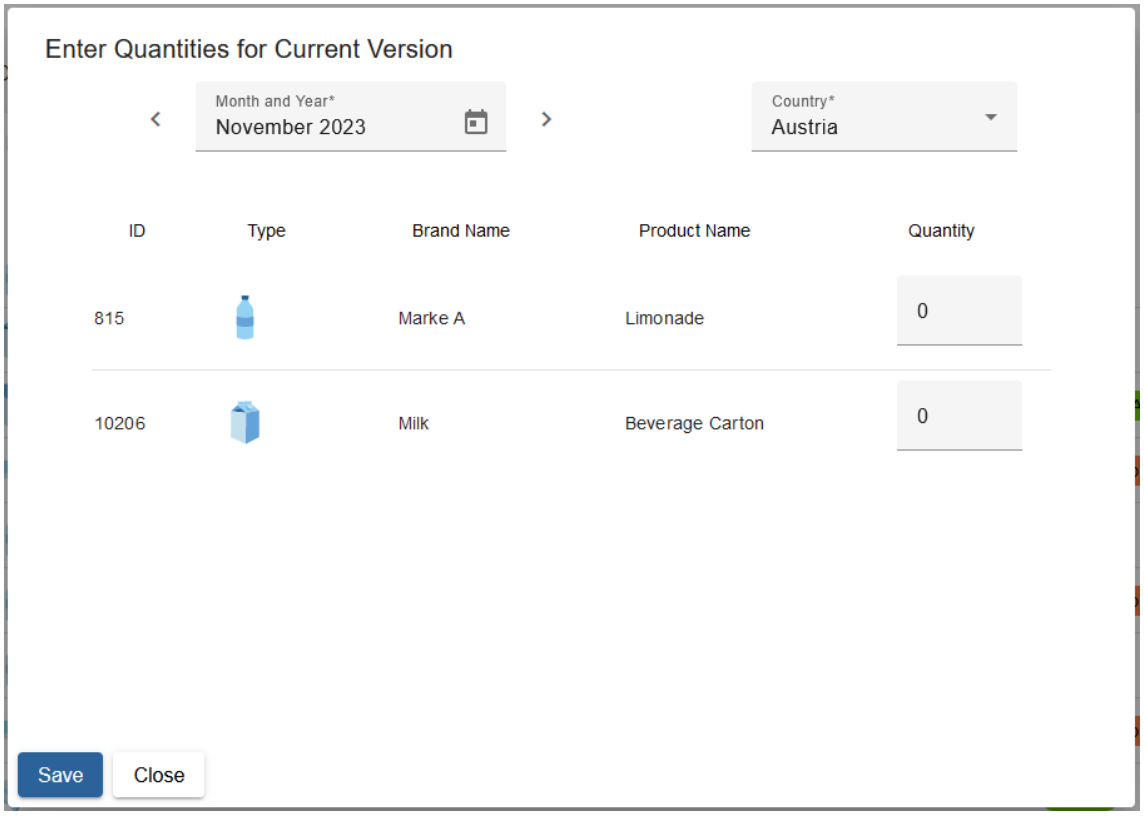


Figure 71: Pop-up quantities multiple data sets

Here, the month and year are changed in the top left corner of the pop-up.

7.2. Carrying out Aggregated Evaluations

Once the quantities for all desired packaging units have been filled out, an aggregated evaluation can be performed. This can be done under "Data Evaluation" in the main menu (Figure 72).

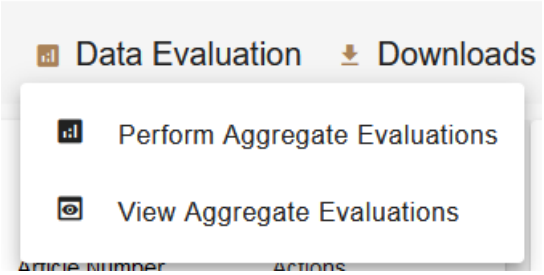


Figure 72: Data Evaluation

First, the desired packaging units must be selected (Figure 73). The data can be filtered by several categories. Only datasets, for which quantities have been entered should be selected.

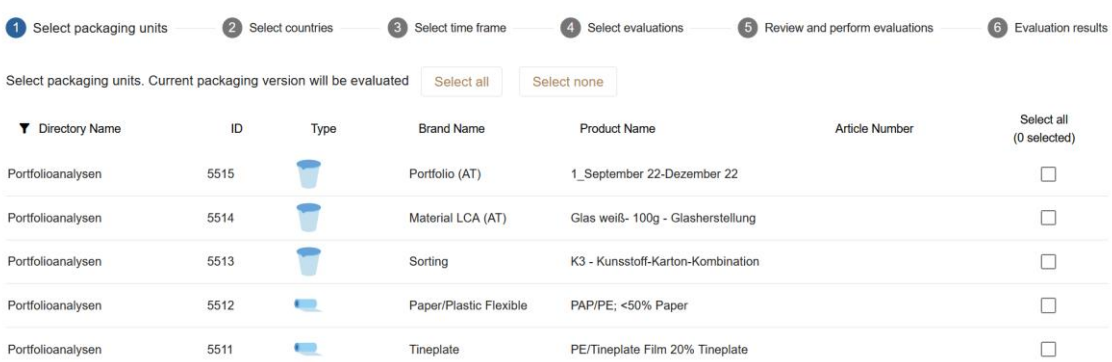


Figure 73: Aggregated Evaluations – Select data

Once the packaging units have been selected, the countries for which the evaluations shall be carried out must be selected (Figure 74). Only countries, for which quantities have been entered should be selected.

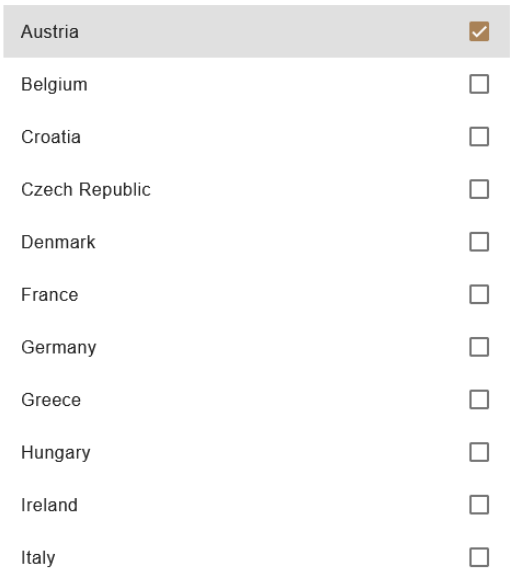


Figure 74: Aggregated Evaluations – Select countries

Next, the timeframe for which the evaluation shall be carried out is selected (Figure 75). Only choose a timeframe, for which quantities have been entered.

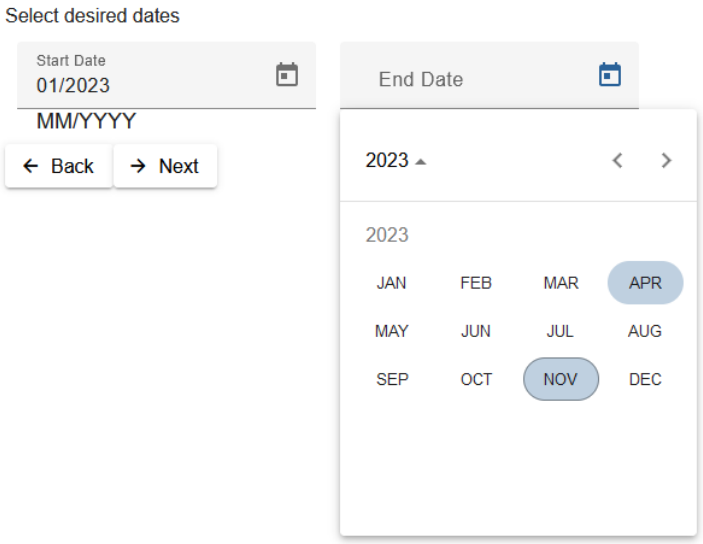


Figure 75: Aggregated Evaluations – Timeframe

Lastly, the type of evaluation to be carried out is selected (Figure 76).

Figure 76: Aggregated Evaluations – Select evaluations

A summary is then shown, and a name can be assigned to the evaluation before it is carried out (Figure 77).

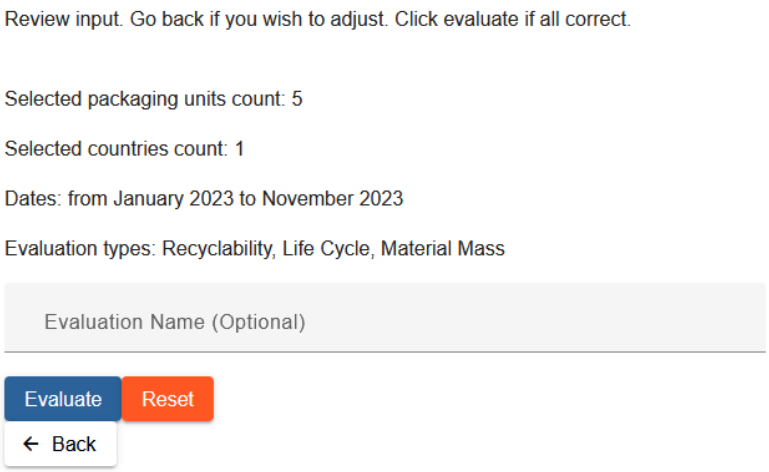
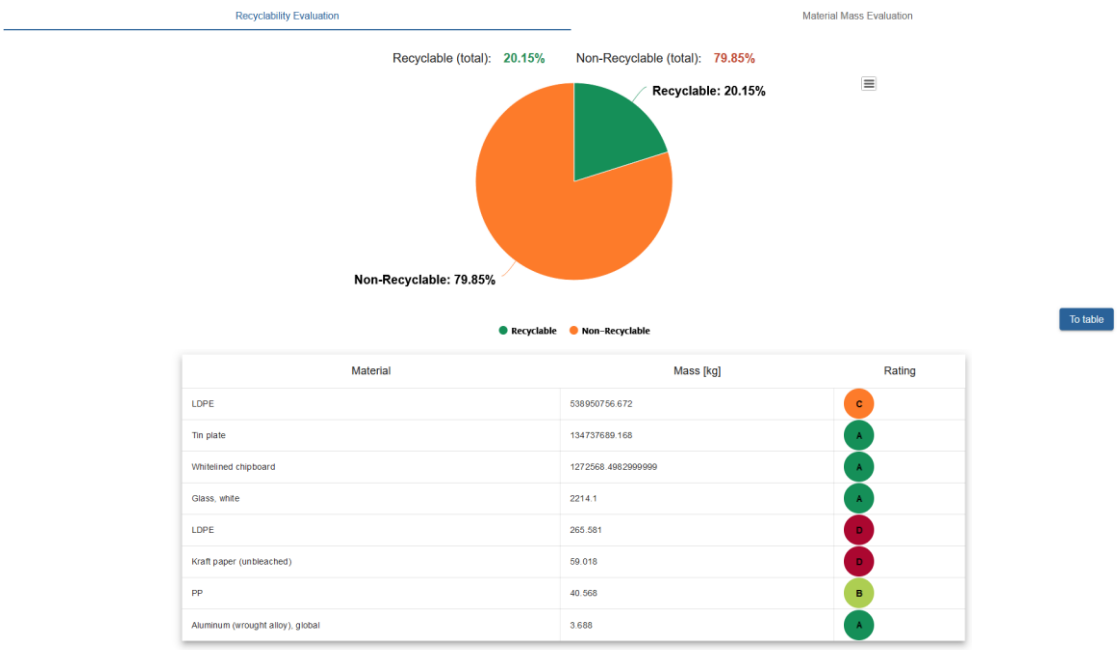
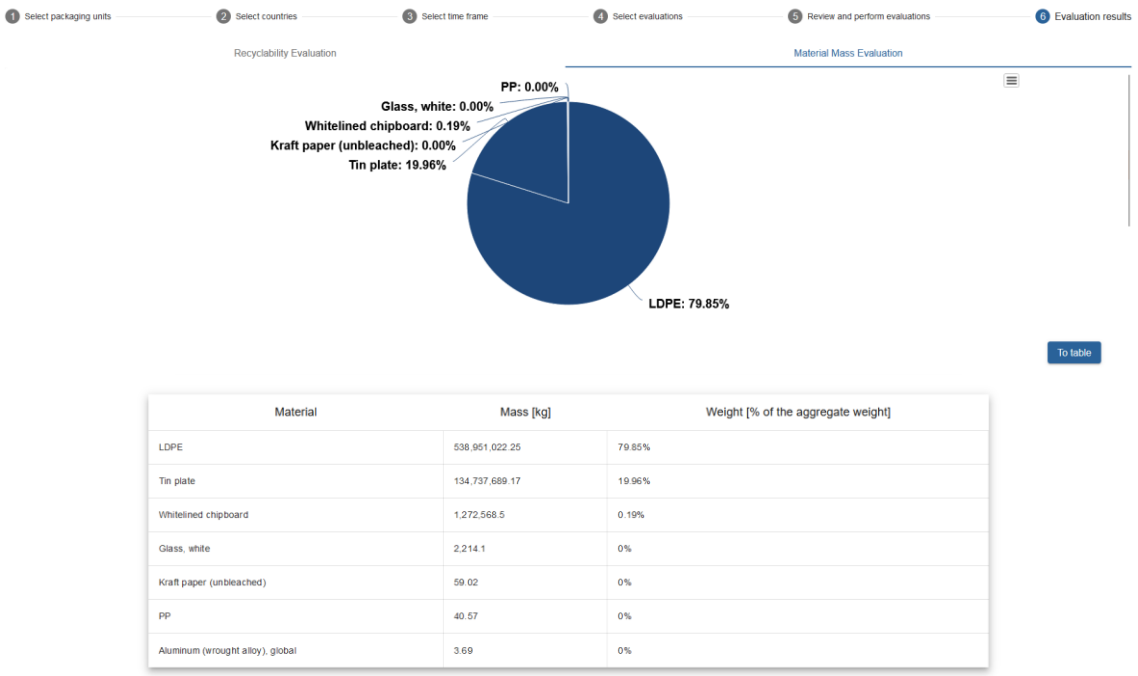


Figure 77: Aggregated Evaluations – Summary

The results are shown in graphical and tabular form (Figure 78).





Material	Mass [kg]	Weight [% of the aggregate weight]
LDPE	538,951,022.25	79.85%
Tin plate	134,737,689.17	19.96%
Whitelined chipboard	1,272,568.5	0.19%
Glass, white	2,214.1	0%
Kraft paper (unbleached)	59.02	0%
PP	40.57	0%
Aluminum (wrought alloy), global	3.69	0%

Figure 78: Aggregated Evaluations – Results

Aggregated Evaluations which have been carried out can be viewed under "View Aggregated Evaluations" (Figure 79). Here, evaluation names can be edited, the selected packaging units are linked, and the entered quantities can be viewed.

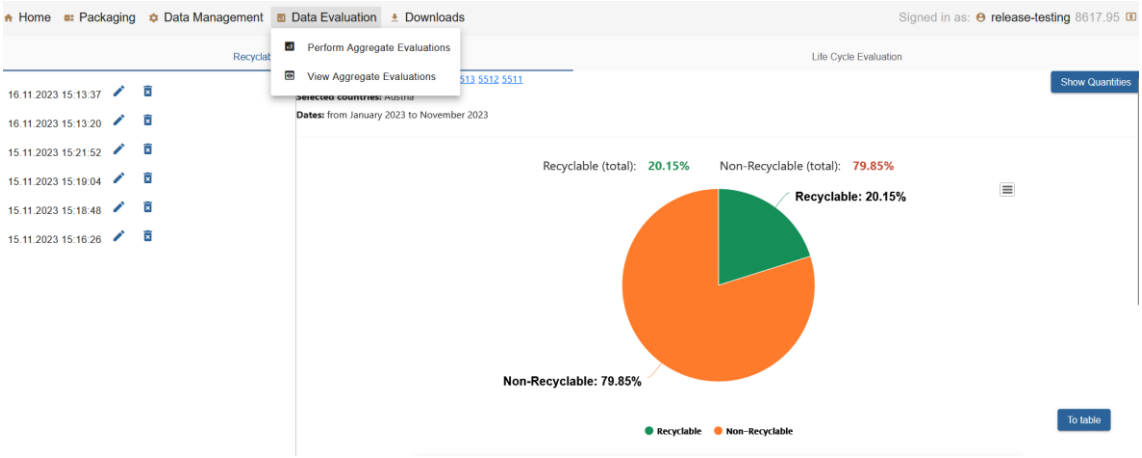


Figure 79: Saved Aggregated Evaluations

8. Reports

Reports are available for packaging units and components. These can be individualized and contain both specification data and calculation results (Figure 80).

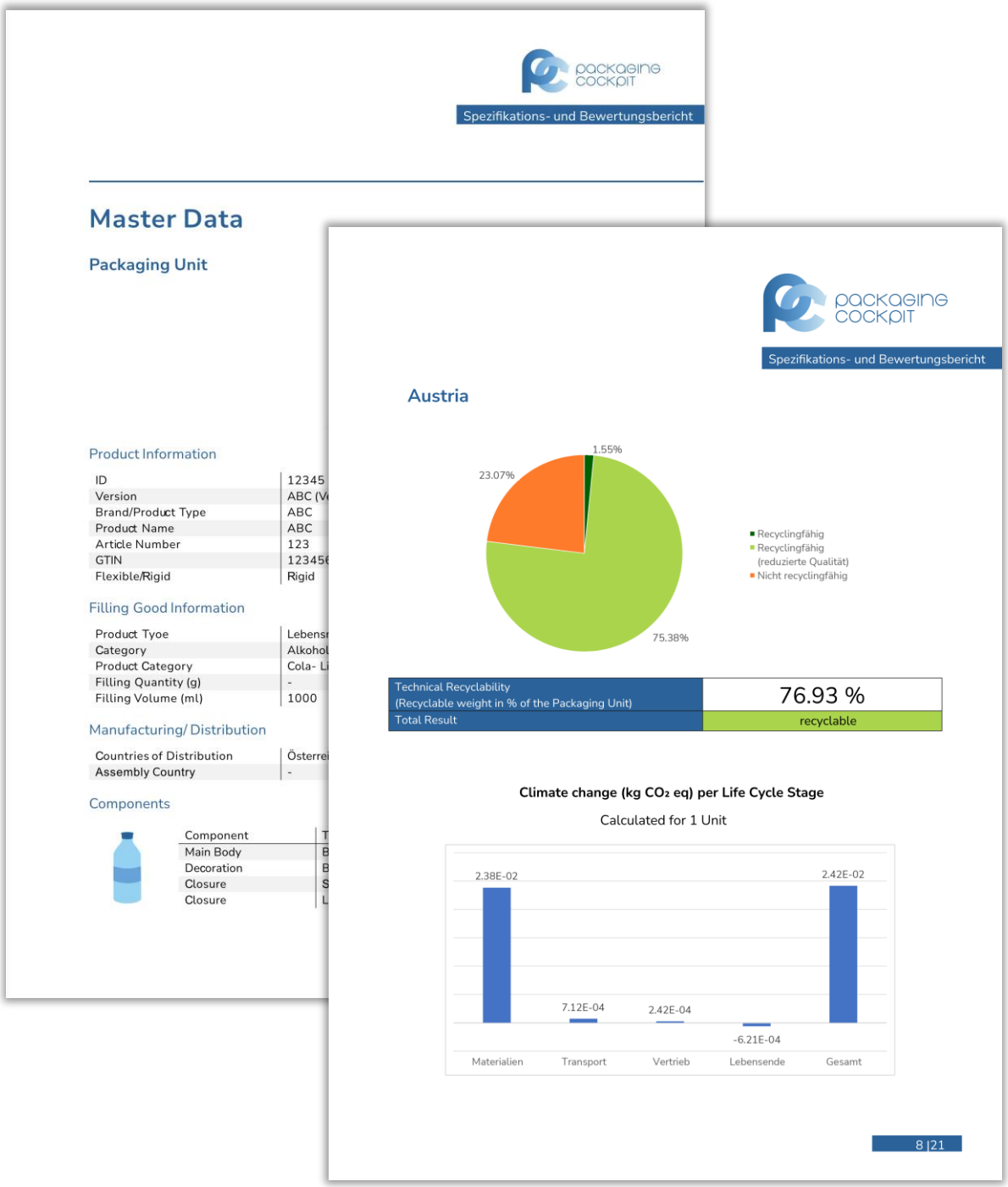


Figure 80: Reports

For the individualization of reports a report template can be generated (Figure 81). Under "Data Management" the Report Template Wizard can be opened, where the information included in reports can be individualized. When generating a report, a template can be chosen. When no template is chosen, all available information is displayed in the report.

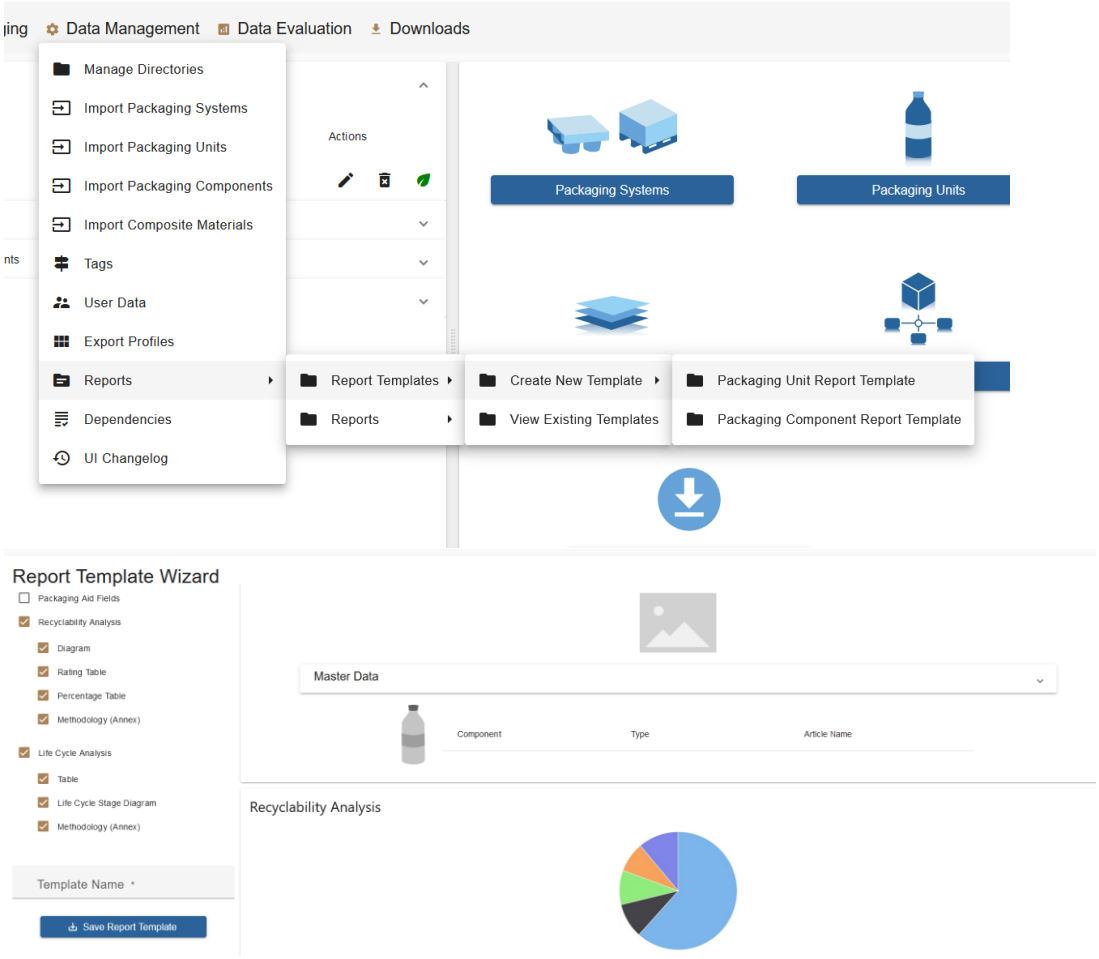


Figure 81: Report template

Reports can be generated for packaging units and packaging components (only specifications). They can be generated in the lefthand side menu of the calculation results, at the bottom of the data input pages of packaging units and components, or in the "Manage Directories" section of the Data Management (Figure 82).

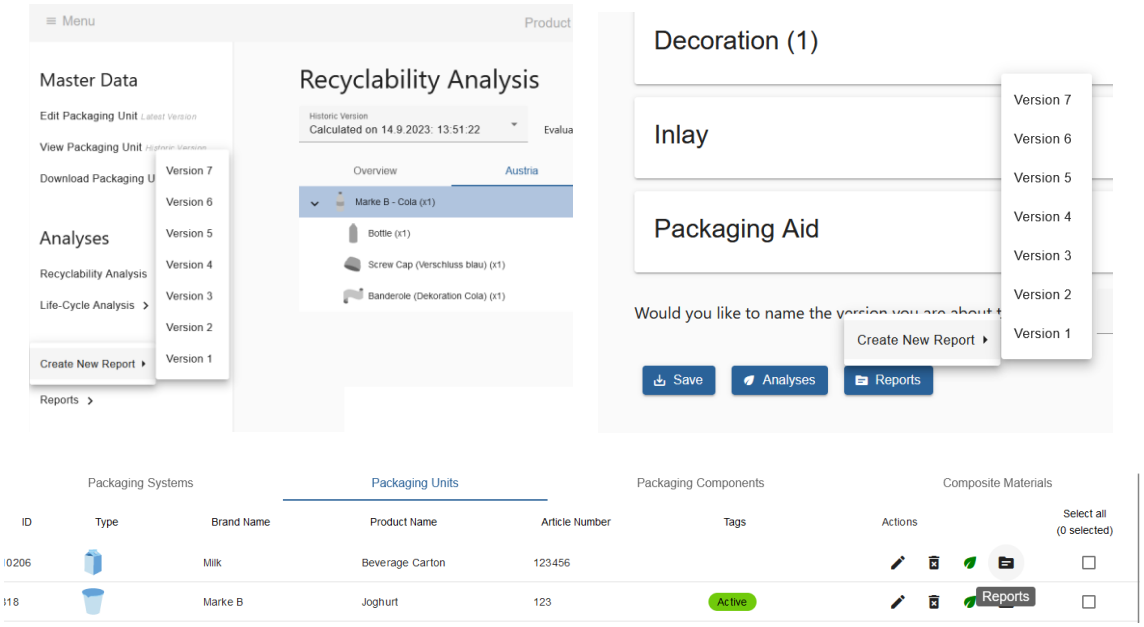


Figure 82: Generating a report

9. Comparison of Packaging Units

Packaging units can be compared to each other.
On the start page, packaging units of the same type can be selected in the "Comparison" area and then evaluated by clicking on the button "Compare selected packaging units" (Figure 83). Packaging units of different types can be selected and compared in the "Data management" area (11 Data Management). Up to 10 packaging units can be compared at once.

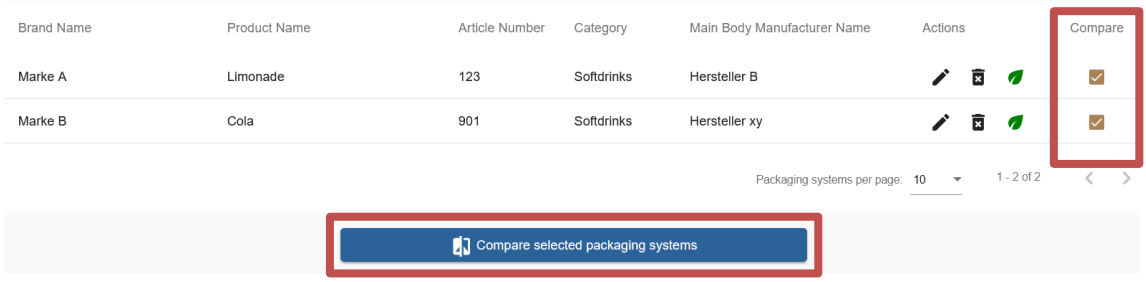


Figure 83: Compare Packaging Units

The comparison of the packaging units refers to the recyclability analysis of the entire packaging unit (Figure 84). Furthermore, a comparison of the life cycle assessments is possible.

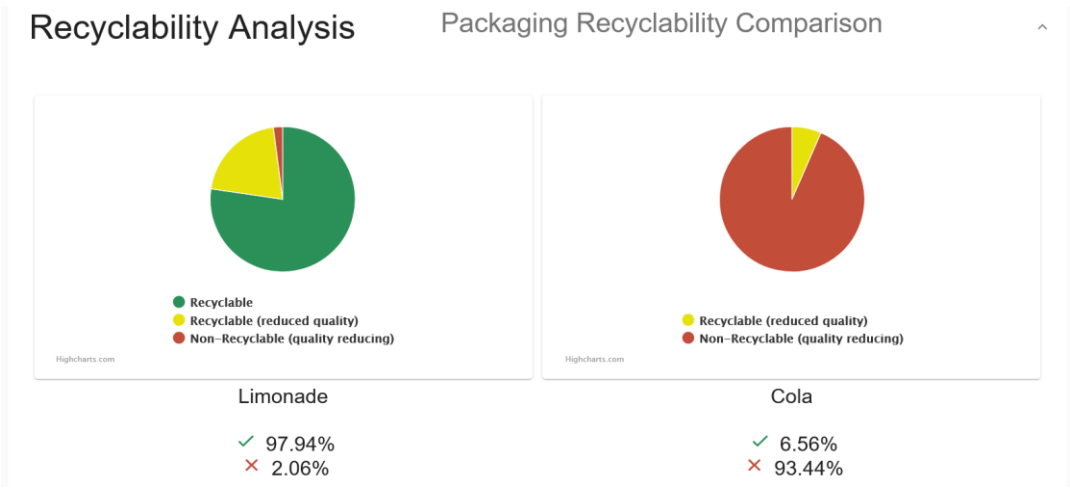
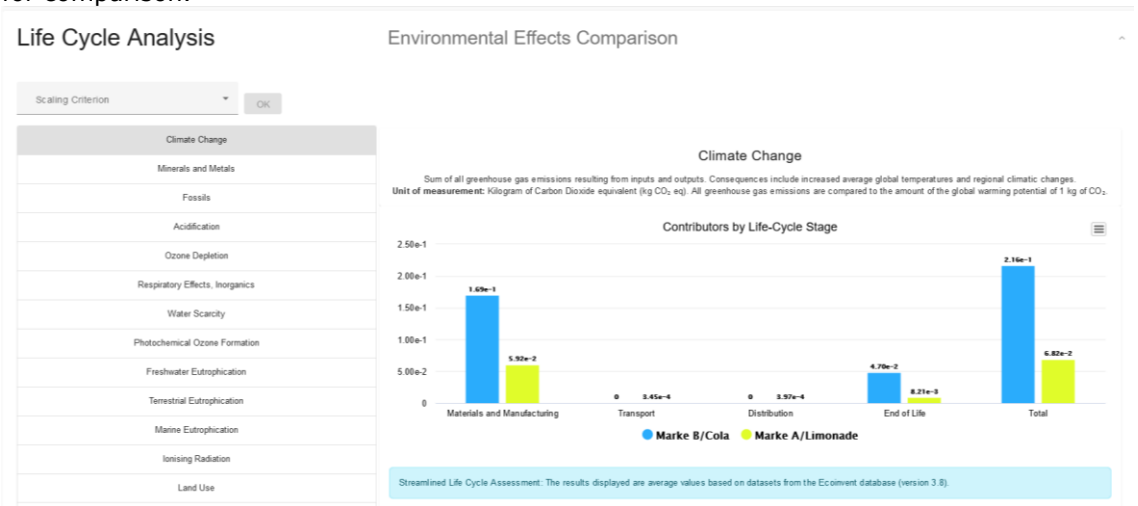


Figure 84: Recyclability Comparison

The last section displays the comparison of the life cycle assessments (Figure 85). The results are displayed congruent to the LCA results of single packaging units.
The impact categories displayed on the bottom of the graph correspond to those which account for 80% of the entire impact according to the PEF Initiative guidelines. If these categories do not match for the compared packaging units, all relevant impact categories are displayed. The results of the individual life cycle assessments can be scaled to filling volume or filling weight for comparison.



Environmental effect	Marke B/Cola	Marke A/Limonade
Climate Change (kg CO_2 eq)	2.16e-1	6.82e-2
Minerals and Metals (g Sb eq)	1.00e-5	3.04e-6
Fossils (MJ)	2.62e+0	1.01e+0
Acidification (mol H+ eq)	1.20e-3	7.07e-4

Figure 85: Comparison of LCA

If two or more packaging units are compared and the Life Cycle Assessment or recyclability analysis has not been carried out for all packaging units, these assessments can be carried out in the comparison interface (Figure 86). These analyses require 1 credit each per country and are saved under existing analyses of the corresponding packaging units.

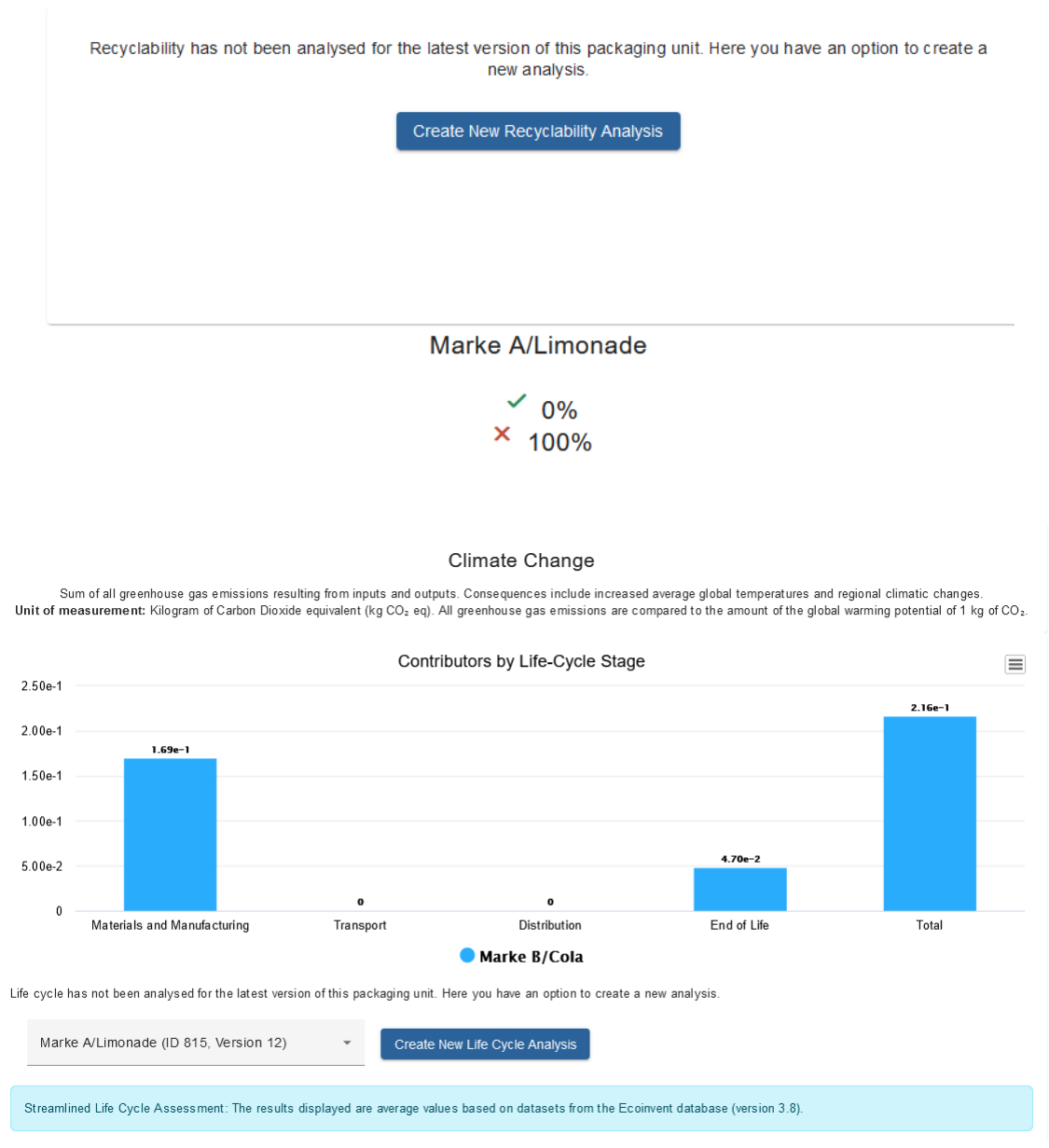


Figure 86: Missing analyses in packaging comparison

10. Editing or Deleting Data Sets

Packaging datasets (systems, units, components, material layers) that have already been created can be edited or deleted. This can be done on the start page under "Actions" or in the "Data management" area (11 Data Management). Next to the packaging unit, an edit icon (pencil) and a delete icon (trash can) are displayed (Figure 87).

Figure 87: Edit or Delete Packaging Data

11. Data Management

In the area "Data Management", user data can be edited and packaging data can be copied, deleted or sorted into folders. In addition, packaging data can be imported from other user accounts or exported to other accounts, export profiles can be created, tags can be managed, and reports and report templates can be created and viewed (Figure 88).

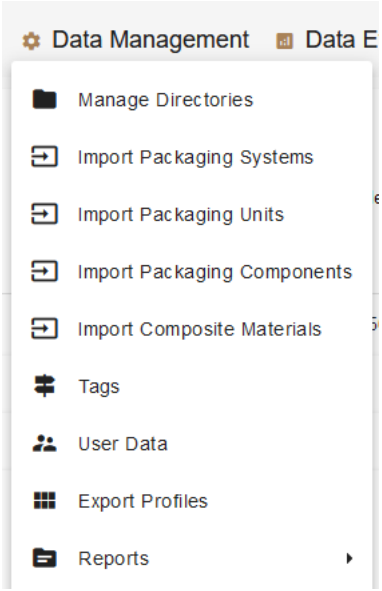


Figure 88: Data Management

11.1. Manage Directories

Under "Manage Directories" all created packaging systems, units, components, and composite materials are displayed. For a better overview, these can be categories in folders. By left-clicking on the main folder, the selection "Create…" appears, with which a subfolder can be created (Figure 89). Packaging units and components can be moved or copied between folders.

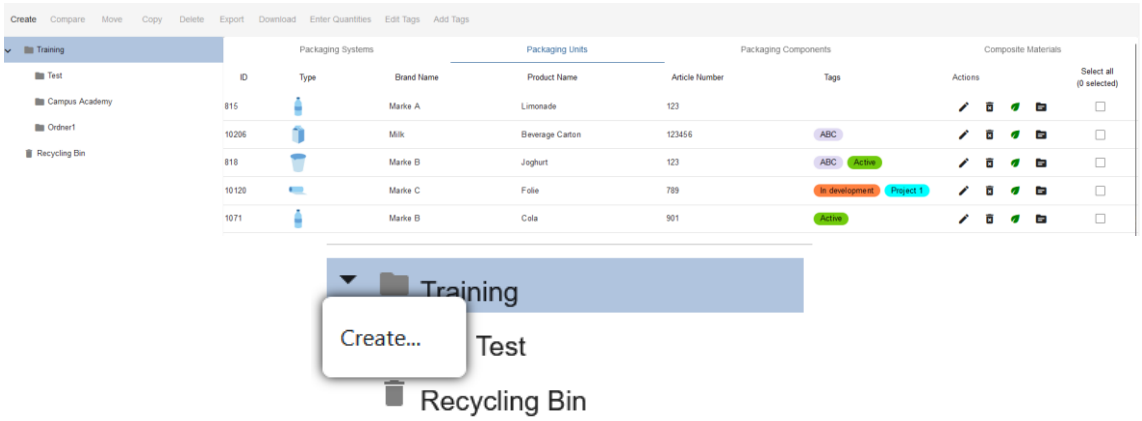


Figure 89: Creating a new Sub-folder

11.2. Managing Packaging Data

To compare, move, copy, delete or export packaging data, they must be selected (Figure 90).

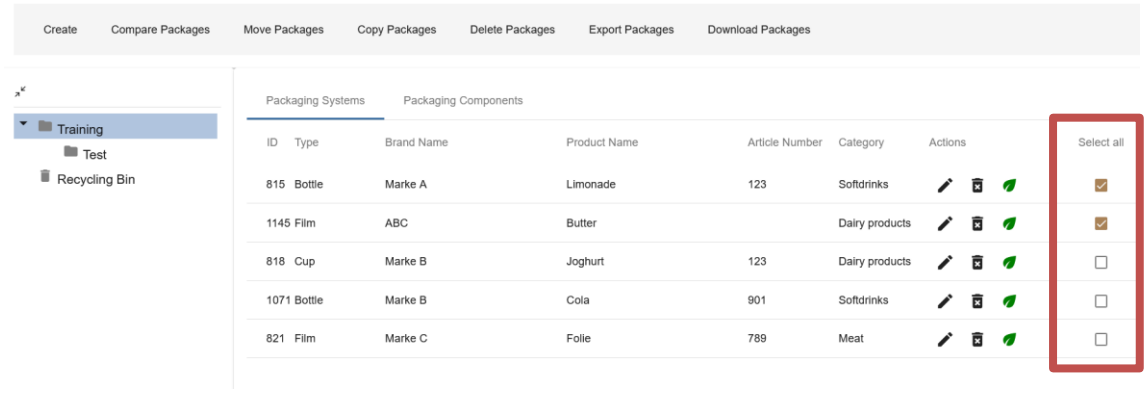


Figure 90: Selecting Packaging Units

11.2.1. Comparing Packaging Units (Data Management)

Packaging units of different types can be compared with each other in the Data Management. After the desired units have been selected, an analysis is carried out by clicking on "Compare" (Figure 91). The analysis is identical to the comparison in the start menu (9 Comparison of Packaging Units).

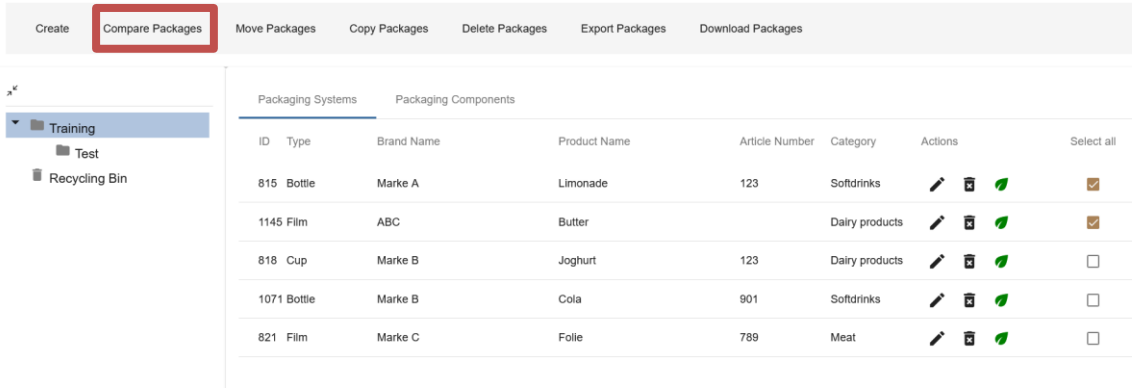


Figure 91: Compare Packaging Units (Data Management)

11.2.2. Exporting Packaging Data

In order to make packaging data available to other users (e.g. customers or manufacturers), they can be exported. To do this, the desired packaging systems, units, components, or composite materials must be selected and then confirmed by clicking on "Export" (Figure 92).

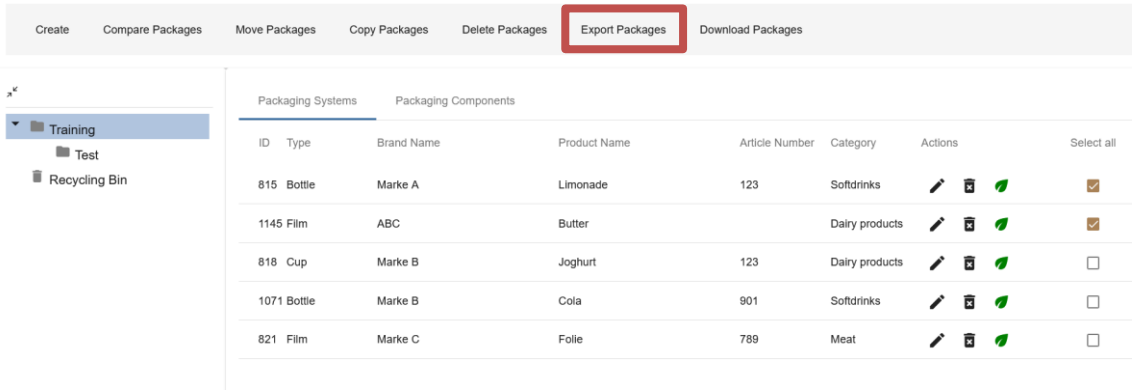


Figure 92: Export Packaging Units

A new window opens, in which target users can be chosen. The packaging unit or components is shared by clicking on the target user(s) and export profiles (described below), if applicable, and then on the "Export" button (Figure 93).

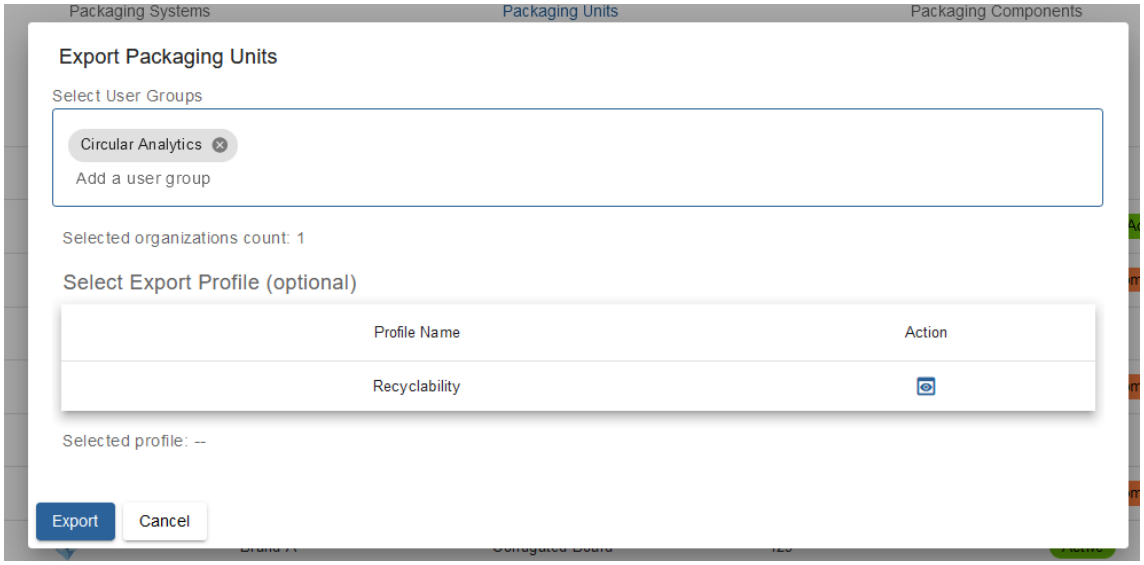


Figure 93: Export to Users

11.3. Export Profiles

When exporting data to other users, an export profile can be generated to specify which specifications should be transferred and which should not. Exports profiles can be created under "Data Management".

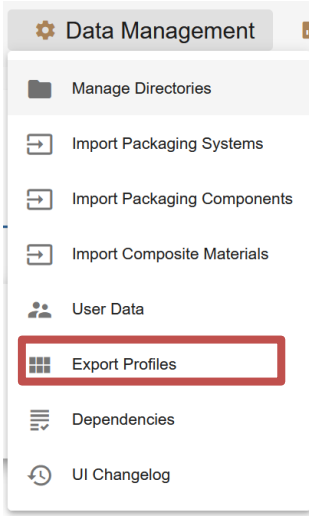


Figure 94: Menu „Export Profiles"

Export profiles can be created for packaging systems, units, components, and composite materials.

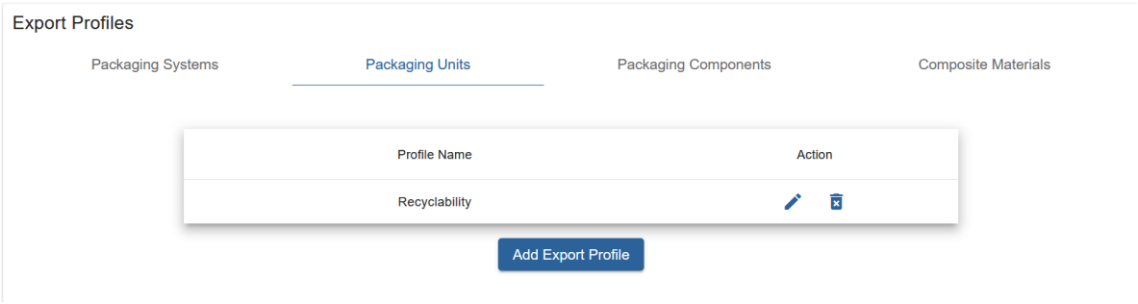


Figure 95: Export profiles

Each data field can be individually selected or deselected. Fields which are required for recyclability or life cycle assessments can be automatically selected or deselected.

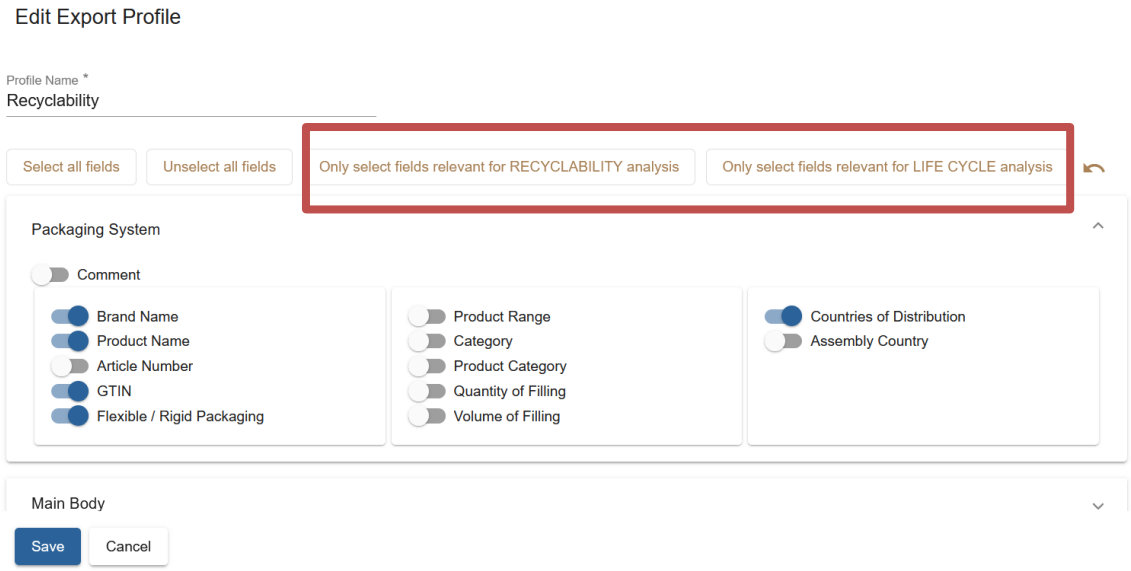


Figure 96: Export profiles- recyclability and life cycle assessment

11.4. Importing Packaging Data

Packaging systems, units, components, and material compositions created by other users can be imported into the data portfolio in the drop-down menu under "Data Management" by clicking on "Import …" (Figure 97).

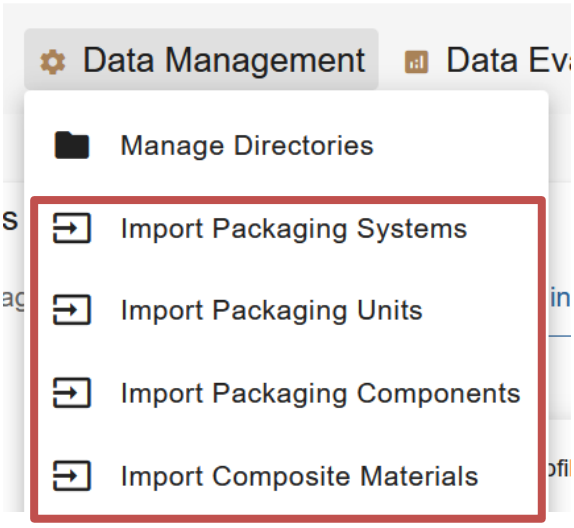


Figure 97: Import Packaging Data

11.4.1. Selecting a Target Folder

In order to import selected packaging data, the destination folder must be specified under "Select location". Once a folder has been defined, the file can be imported by clicking on the "Proceed" button (Figure 98).

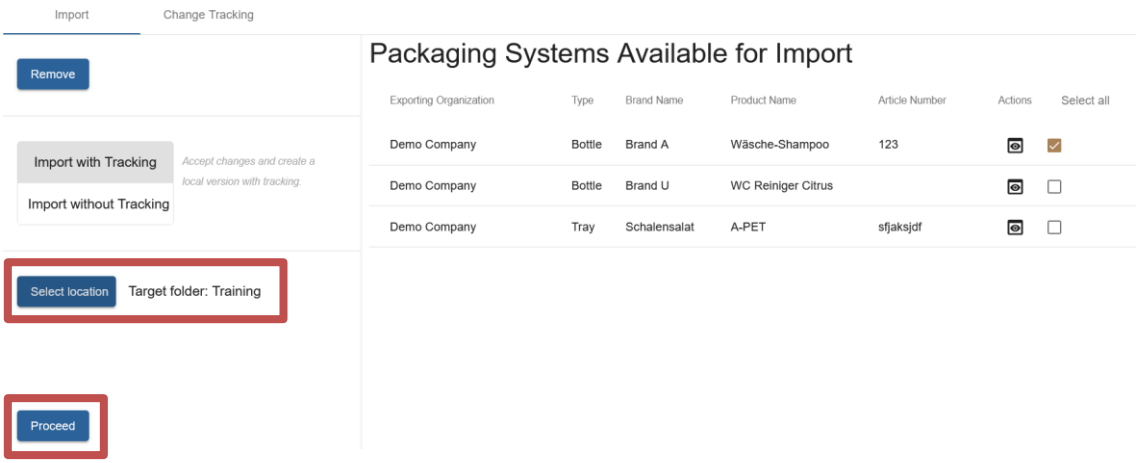


Figure 98: Selecting a Target Folder for Importing

11.4.2. Importing with / without Tracking

Packaging data created and shared by other users can be imported either as a local copy (import without tracking) or as a live file (import with tracking). If the file is imported with tracking, any changes made to the original file can be tracked. This is not possible when importing without tracking. In files with tracking, some inputs cannot be changed (as these inputs are tracked), in files without tracking all inputs can be changed (Figure 99).

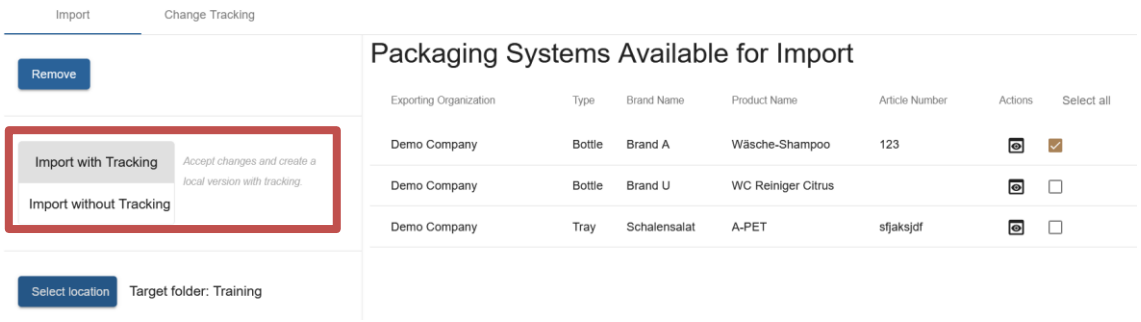


Figure 99: Importing with/ without Tracking

11.4.3. Change Tracking

If packaging units or components are imported with tracking, they will be displayed in the "Change Tracking" area as soon as a change is made in the original file (Figure 100). These changes can be imported again. It is possible to overwrite the packaging unit/component or to import the changes as a new packaging unit or component (with or without tracking).

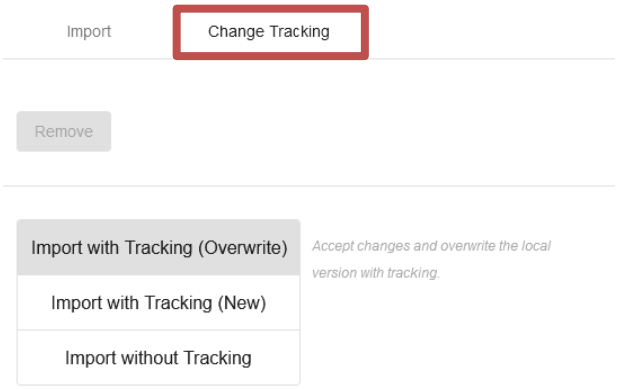


Figure 100: Change Tracking

12. Versions

If a packaging unit or component is changed and saved, a pop-up opens, asking the user whether a new version should be created (Figure 101).

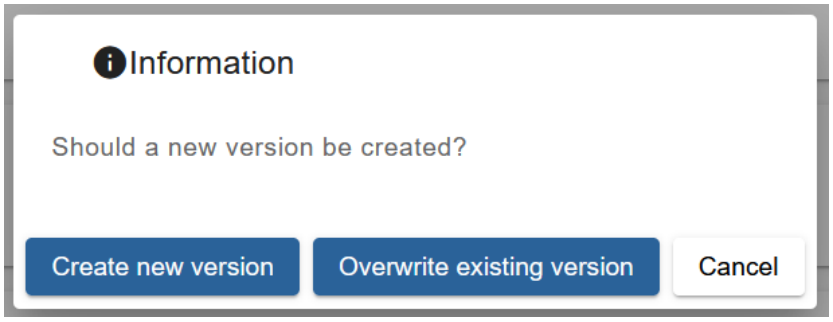


Figure 101: Saving Changes

If a new version in created, previous versions can be viewed on top of a data set under "Historic Versions" (Figure 102). When creating a new version, all old analyses (if applicable) are saved and can be viewed under "Existing Analyses" (Figure 103). New analyses can also be carried out for old versions.

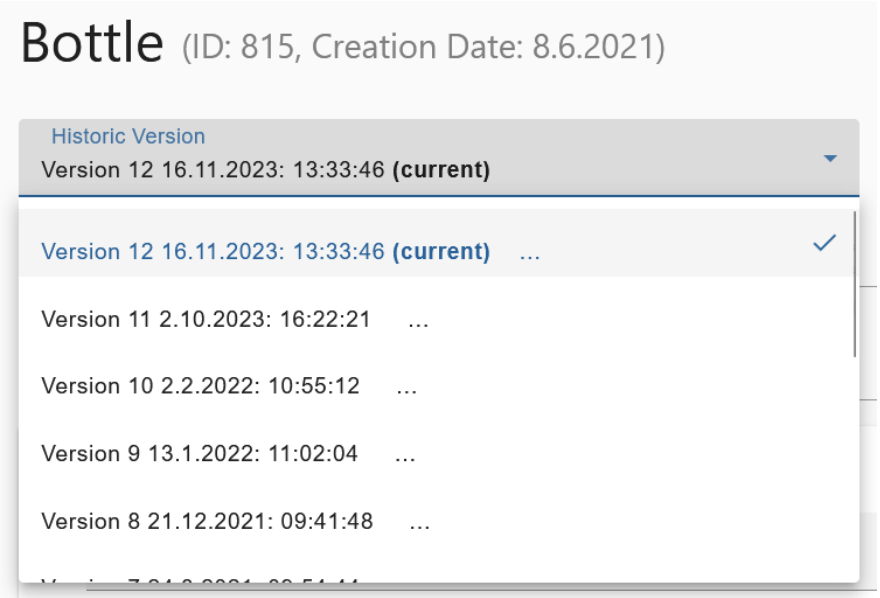


Figure 102: Versions

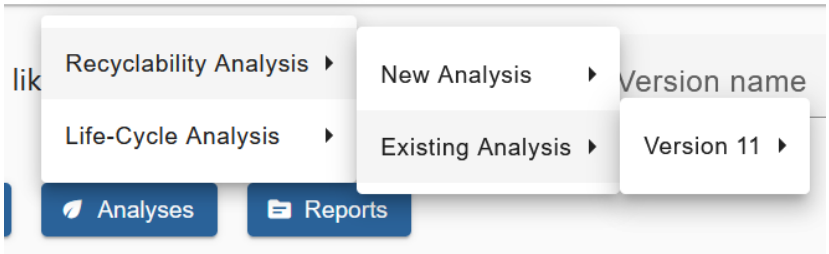


Figure 103: Existing Analyses

Data versions can also be overwritten, and no new version is created. In this case, all existing analyses carried out for the overwritten version are deleted and cannot be viewed again (Figure 104).

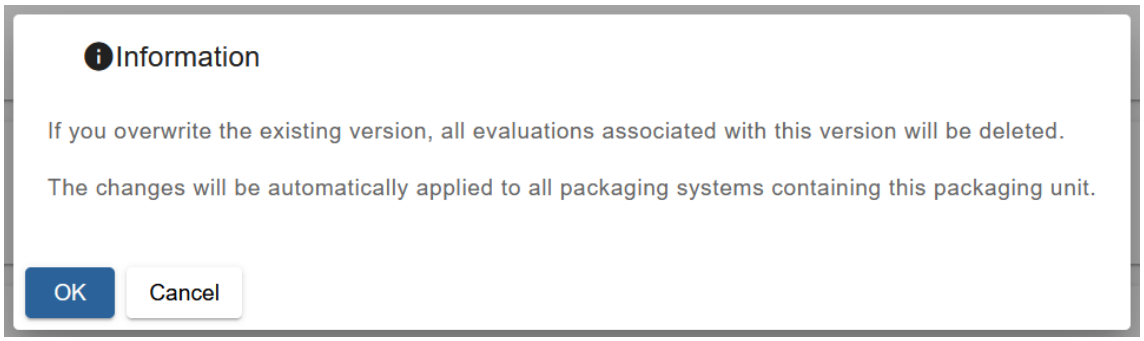


Figure 104: Overwriting data

13. Trouble Shooting

When encountering a problem with the Packaging Cockpit, please contact the support at **support@packaging-cockpit.com** or **office@packaging-cockpit.com**.

When you have a problem with a specific packaging system, unit, component, or composite material, please always note and state the ID of the corresponding dataset. The ID can be found in the data management (Figure 105) or on top in the dataset (Figure 106).

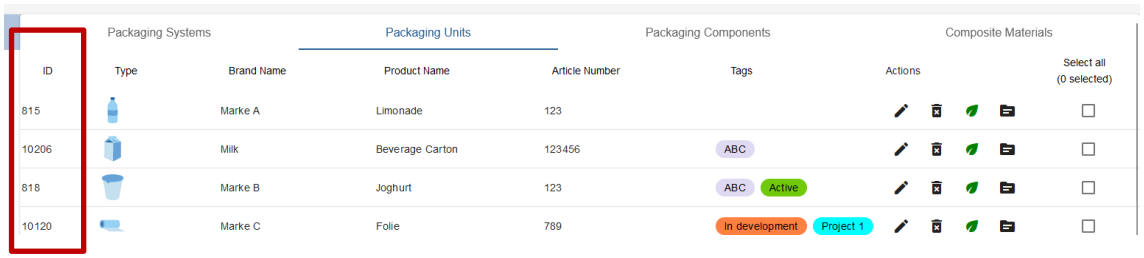


Figure 105: ID Data Management

Figure 106: ID Dataset

When you encounter a problem with a specific analysis, please also note and state the evaluation ID on top of the page (Figure 107).

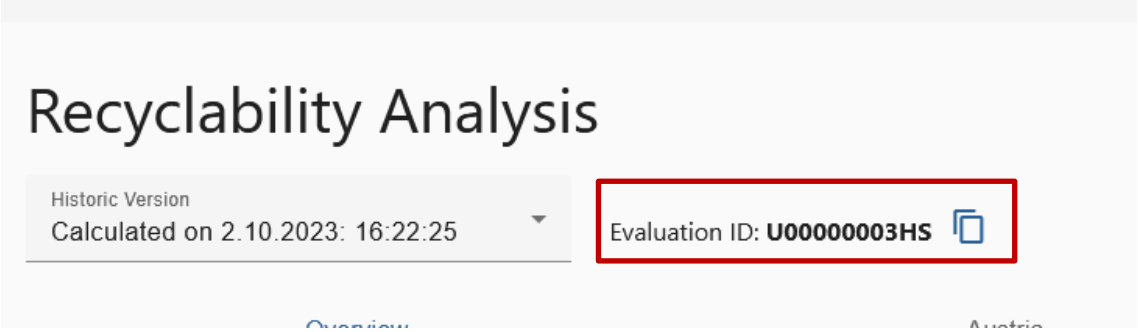


Figure 107: Evaluation ID

Table of Figures

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