Environmental Product Declaration (EPD)
according to ISO 14025 and EN 15804+A2

# Installation walls with Uni-cisterns




| | |
|---|---|
| Registration number: | EPD-Kiwa-EE-000440-EN |
| Issue date: | 26-06-2025 |
| Valid until: | 26-06-2030 |
| Declaration owner: | TECE SE |
| Publisher: | Kiwa-Ecobility Experts |
| Program operator: | Kiwa-Ecobility Experts |
| Status: | Verified |

# 1 General information

## 1.1 PRODUCT

Installation walls with Uni-cisterns

## 1.2 REGISTRATION NUMBER

EPD-Kiwa-EE-000440-EN

## 1.3 VALIDITY

Issue date: 26-06-2025

Valid until: 26-06-2030

## 1.4 PROGRAMME OPERATOR

Kiwa-Ecobility Experts
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Raoul Mancke

*(Head of programme operations, Kiwa-Ecobility Experts)*



Kripanshi Gupta

*(Verification body, Kiwa-Ecobility Experts)*

## 1.5 OWNER OF THE DECLARATION

**Declaration owner:** TECE SE

**Address:** Hollefeldstr. 57, 48282 Emsdetten, Germany

**E-mail:** info@tece.de

**Website:** www.tece.com

**Production location:** TECE Sp. z o.o., Strzelin, Poland

**Address production location:** Wroclawska 61, 57-100 Strzelin, Poland

**Production location:** TECE Kunststofftechnik GmbH, Germany

**Address production location:** Hollefeldstr. 57, 48282 Emsdetten, Germany

**Production location:** TECE Sanitary & Building Material (Shanghai) Co., Ltd, China

**Address production location:** No. 3037 Kaixun Rd., Xuhui District, Shanghai 200030, China

**Distribution via:** TECE Sp. z o.o., Strzelin, Poland

## 1.6 VERIFICATION OF THE DECLARATION

The Independent verification is in accordance with ISO 14025:2011. The LCA is in compliance with ISO 14040:2006 and ISO 14044:2006. The EN 15804:2012+A2:2019 serves as the core PCR.

☐ Internal ☐ External



Lucas Pedro Berman, Senda

(Third party verifier)

## 1.7 STATEMENTS

The owner of this EPD shall be liable for the underlying information and evidence. The program operator Kiwa-Ecobility Experts shall not be liable with respect to manufacturer data, life cycle assessment data and evidence.

## 1.8 PRODUCT CATEGORY RULES

PCR A

Kiwa-Ecobility Experts (Kiwa-EE) - General Product Category Rules (2022-02-14)

PCR B

IBU – PCR Part B: Requirements for the EPD for sanitary installations

## 1.9 COMPARABILITY

In principle, a comparison or assessment of the environmental impacts of different products is only possible if they have been prepared in accordance with EN 15804. For the evaluation of the comparability, the following aspects have to be considered in particular: PCR used, functional or declared unit, geographical reference, the definition of the system boundary, declared modules, data selection (primary or secondary data, background database, data quality), scenarios used for use and disposal phases, and the life cycle inventory (data collection, calculation methods, allocations, validity period). PCRs and general program instructions of different EPDs programs may differ. Comparability needs to be evaluated. For further guidance, see EN 15804+A2 (5.3 Comparability of EPD for construction products) and ISO 14025 (6.7.2 Requirements for comparability).

## 1.10 BASIS OF ACCOUNTING

| | |
|---|---|
| **LCA method :** | EN15804+A2 |
| **LCA Software** | LCA for Experts - Sphera |
| **Characterization method:** | EN 15804 +A2 |
| **LCA Database Profile:** | MLC Database - Manufacturing and End of Life |
| **Database version** | 2024.1; last change 01.04.2024 |
| **LCA Database Profile:** | MLC Database -Plastics |
| **Database version** | 2024.1; last change 01.04.2024 |
| **LCA Database Profile:** | MLC Database - Electrics and Electronics |
| **Database version** | 2024.2; last change 01.08.2024 |
| **LCA Database Profile:** | MLC Database - Professional Core |
| **Database version** | 2024.2; last change 01.08.2024 |

## 1.11 LCA BACKGROUND REPORT

This EPD is prepared on the basis of the LCA background report LCA report Uni-flush tank Grp 2.

# 2 Product

## 2.1 PRODUCT DESCRIPTION

This declaration refers to an average of products (see table) with a total GWP value in the sum of A1-A3 with a deviation of ± 40 %.

TECEprofil toilet module are suitable to TECEprofil section tubes or for installation in metal/wooden stud walls and as a pre-wall or corner module. They are also suitable for single block assembly.

Uni-cistern for actuation from the front:

- safety tank made of impact-resistant plastic, tested in accordance with EN 14055
- cistern completely pre-assembled and sealed
- cistern connection with outer thread R 1/2" on the side, compatible with quick adapters
- 10 liter tank volume 6 liter preset standard flush volume 4/4.5/7.5/9 liter flush volume adjustable at any time 2 or 3 liter partial flush with dual-flush technology remaining volume can be used for immediate cleaning flush.
- insulated against condensation water
- for TECE flush plates and toilet flush handle
- can be used as a single or dual-flush cistern
- "easy fit" flush plate installation
- installation tunnel for service opening, can be shortened without tools
- quiet hydraulic filling valve, acoustic group 1 according to DIN 4109

The respective national regulations apply for use.

The TECEprofil and TECEbox toilet module with Uni-cistern is supplied in cardboard packaging secured with foil on a disposable pallet.

This EPD covers the following products:

| Article no. | Description |
|---|---|
| 9041036 | TECE Uni-cistern with WRAS approval, 1060 |
| 9300102 | TECEprofil WC module with Uni cistern, with integrated hygienic flush function hot and cold water, 1120 |
| 9300103 | TECEprofil WC module with Uni cistern, with integrated hygienic flush function cold water, 1120 |
| 9300104 | TECEprofil WC module with Uni cistern, with integrated hygienic flush function hot and cold water, 1120 |
| 9300105 | TECEprofil WC module with Uni cistern, with integrated hygienic flush function cold water, 1120 |
| 9300291 | TECEprofil WC module with Uni 750 cistern, 750 |
| 9300300 | TECEprofil WC module with Uni cistern, 1120 |
| 9300301 | TECEprofil WC module with Uni cistern, 820 |
| 9300302 | TECEprofil WC module with Uni cistern, 1120 |
| 9300303 | TECEprofil WC module with Uni cistern, with connection for odor extraction (DN 70), 1120 |
| 9300304 | TECEprofil WC module with Uni cistern, for universal connection of a shower toilet, 1120 |
| 9300305 | TECEprofil WC module with Uni cistern, for universal connection of a shower toilet, 980 |
| 9300306 | TECEprofil WC-module with Uni cistern for universal connection, 820 |
| 9300308 | TECEprofil WC geronto module with Uni cistern, ceramic attachment for 48 cm seat height in accordance with DIN 18040-1, 1120 |
| 9300313 | TECEprofil WC module with Uni cistern, 1120 |
| 9300318 | TECEprofil WC module with Uni cistern, 820 |
| 9300322 | TECEprofil WC module with Uni cistern, 980 |
| 9300329 | TECEprofil WC module ‘Design’ with Uni cistern, WRAS approval, 980 |
| 9300335 | TECEprofil WC module with Uni cistern, wall mounting and sound insulation set, 1120 |
| 9300345 | TECEprofil WC module with Uni cistern, 1120 |
| 9300358 | TECEprofil WC module with Uni cistern, Nordic without sealing bag, 980 |
| 9300361 | TECEprofil WC module with Uni cistern, Nordic with sealing bag, 1120 |
| 9300364 | TECEprofil WC module with Uni cistern, Nordic without sealing bag, 820 |
| 9300366 | TECEprofil WC module with Uni cistern for Geberit Publica sinks, height |
| 9300367 | TECEprofil WC module with Uni cistern, Nordic without sealing bag, 1120 |

| | |
|---|---|
| 9300379 | TECEprofil WC module with Uni cistern, for universal connection of a shower toilet, 1120 |
| 9300380 | TECEprofil WC module with Uni cistern, for universal connection of a shower toilet, 820 |
| 9300382 | TECEprofil WC module with Uni cistern, for universal connection of a shower toilet, 980 |
| 9300383 | CW16 Installation system with Uni cistern, for universal connection of a shower toilet, 1120 (Laufen module) |
| 9300384 | CWL17 Installation system with Uni cistern, for universal connection of a shower toilet, 980 (Laufen module) |
| 9300385 | CWL18 Installation system with Uni cistern, for universal connection of a shower toilet, 820 (Laufen module) |
| 9300388 | TECEprofil WC-module Kids with Uni-cistern for floor-standing WC, 1120 |
| 9300389 | TECEprofil WC module with Uni cistern, with connection for odor extraction (DN 50), 1120 |
| 9370300 | TECEbox Toilet module with Uni- cistern, 1060 |
| 9371300 | TECEbox WC module with Uni cistern, with tile able front paneling, installation height 1110 |
| 9375300 | TECEbox WC module with Uni cistern and tile support front, 820 |
| 9375304 | TECEbox WC module with Uni cistern, 820 |
| 9400300 | TECEbase WC module with Uni cistern, Nordic without sealing bag, 1120 |
| 9400301 | TECEbase Uni cistern Nasza Łazienka |
| 9400302 | TECEconstruct WC module ‘Professional’ with Uni cistern, WRAS approval, 1120 |
| 9400303 | TECEconstruct WC module ‘Professional’ with Uni cistern, WRAS approval, 980 |
| 9400304 | TECEprofil WC module with universal cistern, for universal connection of a shower toilet, 1120 |
| 9400411 | TECEbase WC set with universal cistern, including TECEambia WC flush plate in white, 820 |
| 9500309 | TECEconstruct WC module ‘Base’ with universal cistern, including dual flush plate TECEbase in white, 1120 |
| 9500310 | TECEconstruct WC module ‘Standard’ with Uni cistern, 1120 |

## 2.2 APPLICATION (INTENDED USE OF THE PRODUCT)

The Installation wall with Uni-cistern is a versatile and robust module that has been specially developed for easy installation. It is ideal for attachment to TECEprofil section tubes and for installation in metal/wooden stud walls. It can also be used as a pre-wall or corner module and for single block assembly.

## 2.3 REFERENCE-UTILISATION-DADUER (RSL)

**RSL product**

The useful life was set at 50 years and was applied, tested and thus confirmed in the design.

**RSL used (years) In this life cycle assessment**

50

## 2.4 TECHNICAL DATA

The exact technical data can be found in the data sheets for the respective products on the website www.tece.com.

The average composition of the product is described in the following table:

| Product raw materials | Unit | Value |
|---|---|---|
| Metals | wt.% | 69,8 |
| Minerals | wt.% | 0,7 |
| Fossil materials | wt.% | 29,5 |

The average composition of the final packaging is described in the following table:

| Final packaging materials | Unit | Value |
|---|---|---|
| Fossil materials | wt.% | 10,5 |
| Biobased materials | wt.% | 89,5 |

## 2.5 SUBSTANCES OF VERY HIGH CONCERN

The product does not contain REACH SVHC substances in quantities larger than 0.1 % (1000 ppm). Individual components are manufactured from brass and may therefore contain up to 2.5 % lead (EC number: 231-100-4, CAS number: 7439-92-1).

## 2.6 DESCRIPTION OF THE MANUFACTURING PROCESS

Installation walls are manufactured at the production facility in Strzelin, Poland. Individual components and assemblies are manufactured in the production facilities in Strzelin (Poland), Emsdetten (Germany) and Taicang (China) and transported to the production facility in Strzelin (Poland). Transport from China to Poland is by container shipment and transport from Germany to Poland is by lorry. The respective sites obtain the raw materials independently and process them further.

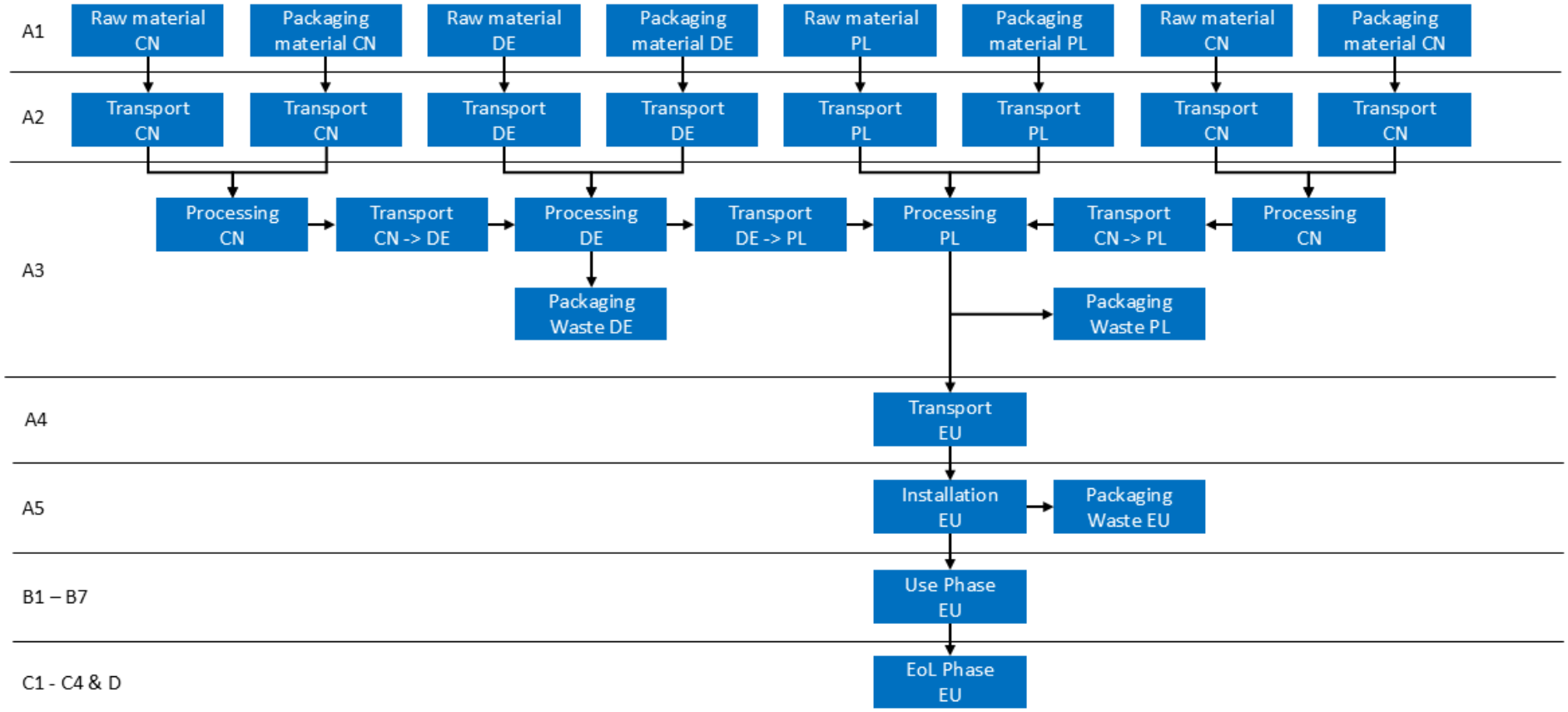



*Figure 1: Production diagram*

# 3 Calculation rules

## 3.1 DECLARED UNIT

This declaration refers to an average of products (see table in chapter 2.2) with a GWP-total value in the sum of A1-A3 with a deviation of ± 40 %.

Reference unit: one piece

## 3.2 CONVERSION FACTOR

| Description | Value | Unit |
|---|---|---|
| Reference unit | 1 | Piece |
| Average weight of a reference unit | 12,0434 | kg/piece |
| Conversion factor to 1 kg | 0,0830 | Piece/kg |

## 3.3 SCOPE OF THE DECLARATION AND SYSTEM BOUNDARIES

This is an EPD from the cradle to the gate with options, modules C1-C4 and modules D

The life cycle stages included are as shown below:

(X = Module declared, ND = Module not declared)

| A1 | A2 | A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X | X | X | X | X | ND | ND | ND | ND | ND | ND | ND | X | X | X | X | X |

The EN 15804+A2 modules include the following:

| | |
|---|---|
| Module A1 = Provision of raw materials | Module B5 = Remodeling/ renovation |
| Module A2 = Transport | Module B6 = Operational energy use |
| Module A3 = Production | Module B7 = Operational water consumption |
| Module A4 = Transport | Module C1 = Deconstruction/demolition |
| Module A5 = Construction / installation process | Module C2 = Transport |
| Module B1 = Utilization | Module C3 = Waste treatment |
| Module B2 = Maintenance | Module C4 = Landfilling |
| Module B3 = Repair | Module D = Benefits and loads outside the system boundary |
| Module B4 = Replacement | |

## 3.4 REPRESENTATIVENESS

This EPD is representative for Installation walls made of TECEprofil with TECE cisterns from TECE SE. The results of this EPD are representative for Europe.

## 3.5 PERFORMANCE CRITERIA

For reasons of simplification and due to imprecise data, colorants for packaging and assembly instructions as well as additional plastic additives were excluded, which accounts for around 0.01 % of the mass. The manufacture of machinery and buildings, transport vehicles, transport of personal to and within the production plant and infrastructure, as well as the maintenance and operation of facilities, company administration, research and development, other long-term emissions and water consumption are also not included.

No other cut-off criteria were applied.

## 3.6 ALLOCATION

Similar goods are produced at the production sites, with data being recorded on a product-specific basis without using a production-wide mass balance. The energy requirement is determined via electricity meters at the production site and calculated for the production volume per period. Waste flows are also recorded and converted on a product-specific basis. The environmental data of the products are determined individually and summarized as an average, with a deviation of ± 40% from the GWP total for modules A1-A3.

System extensions and allocations include the substitution of fossil fuels through energy generation with thermal utilization of waste in modules A3, A5 and C3. The energy generated is credited to the system, whereby it is assumed that electricity from

the respective electricity mix is substituted. In addition, material substitution of primary material through recycling in the end-of-life phase is assumed.

## 3.7 DATA COLLECTION AND REFERENCE PERIOD

Primary data, which includes all raw materials, packaging materials, energy consumption and auxiliary materials, was collected comprehensively for the reference year 2024.

## 3.8 ESTIMATES AND ASSUMPTIONS

The quantities of raw materials and the transport routes from the suppliers and the internal transport routes were determined. The standard values from the LCA calculation program were used for the means of transport and the processing of plastics. For transport to the construction site (A4), a distance of 500 km was assumed for scaling and 50 km for disposal (C2). The standard values from the LCA calculation program were also used for the recycling rates.

## 3.9 DATA QUALITY

The data used for balancing the products originate from verified (partly reweighted) master data and are representative for the reference year 2024. An LCA calculation program with the associated background database was used to prepare the life cycle inventory and the impact assessment. Corresponding data sets for the respective raw materials, transport, energy and processing, taking into account the temporal and geographical aspects, were selected accordingly and are used. This means that the temporal, geographical and technological quality is very good.

## 3.10 ENERGY MIX

Local electricity grid mix is used at the production sites in Germany, Poland and China. At the China site, we use some of our own solar power, which reduces electricity consumption for production/assembly in China. For the EoL-Phase is used Europa grid mix.

| GWP – total according to EF 3.1 | Unit | Value |
|---|---|---|
| Germany grid mix | kg $CO_2$ / kWh | 0,3999 |
| Poland grid mix | kg $CO_2$ / kWh | 0,7823 |
| China grid mix | kg $CO_2$ / kWh | 0,7618 |
| Europe grid mix | kg $CO_2$ / kWh | 0,2892 |

# 4 Scenarios and additional technical information

## 4.1 PROVISION OF RAW MATERIALS (A1)

The raw materials for the respective countries (Germany, Poland and China) are purchased in the respective countries. These are, for example, metal parts (screws) and plastic granulate for the respective plastic parts.

## 4.2 TRANSPORT RAW MATERIAL TO THE PLANT (A2)

The raw materials purchased in each country are delivered by truck from the supplier to the respective plants.

## 4.3 PRODUCTION (A3)

The injection molding process for manufacturing plastic parts is used at the sites in Germany, China and Poland. The resulting components are further processed or pre-assembled, depending on the location.

In China, certain components are manufactured using the injection molding process and assembled into modules such as the drain valve and the filling valve. These assemblies are transported to Poland by ship. Trucks are used for transportation to and from the port. Disposable packaging is used for this.

In Germany, special parts required for the end product are produced in series by injection molding. These components are transported to the Polish plant by truck in reusable packaging.

Other plastic parts are also injection molded in Poland. The final assembly of the mounting walls takes place at the plant there. The components from Germany and the pre-assembled valve assemblies from China are brought together to form the finished product.

After assembly, the end product is packed in its final sales packaging.

## 4.4 TRANSPORT TO THE CONSTRUCTION SITE (A4)

The installation wall is delivered to the customer by truck. The distance was set to 500 km for easier scaling.

## 4.5 CONSTRUCTION / INSTALLATION PROCESS (A5)

The installation wall delivered to the construction site is installed in the building by hand. The packaging is disposed of at disposal centers close to the construction site.

## 4.6 USE-Phase (B1 – B7)

Not declared.

## 4.7 DISMANTLING / DEMOLITION (C1)

Dismantling from the building is carried out by hand, as is installation in the building.

## 4.8 TRANSPORT FOR WASTE TREATMENT (C2)

The waste produced during dismantling is transported by bulk truck (50 km) to waste treatment.

## 4.9 WASTE TREATMENT & LANDFILL (C3, C4)

The waste is treated according to its materials, recycling, waste incineration and landfilling.

## 4.10 BENEFITS AND BURDENS OUTSIDE THE SYSTEM BOUNDARY (D)

Credits resulting from recycling and waste treatment.

# 5 Results

For the impact assessment, the characterization factors of the LCIA method EN 15804+A2 Method v1.0 are used. Long-term emissions (>100 years) are not considered in the impact assessment. The results of the impact assessment are only relative statements that do not make any statements about endpoints of the impact categories, exceedance of threshold values, safety margins or risks. The following tables show the results of the indicators of the impact assessment, of the use of resources as well as of waste and other output flows.

## 5.1 ENVIRONMENTAL IMPACT INDICATORS PER UNIT

**CORE ENVIRONMENTAL IMPACT INDICATORS EN15804+A2**

| Abbreviation | Unit | A1 | A2 | A3 | A1-A3 | A4 | A5 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AP | mol $H^+$ eqv. | 8,08E-02 | 1,72E-03 | 1,85E-02 | 1,01E-01 | 1,43E-03 | 3,80E-03 | 0,00E+00 | 9,35E-04 | 9,17E-04 | 4,82E-05 | -5,91E-02 |
| GWP-total | kg $CO_2$ eqv. | 2,57E+01 | 8,84E-01 | 6,92E+00 | 3,35E+01 | 7,34E-01 | 6,15E+00 | 0,00E+00 | 1,61E-01 | 1,90E+00 | 7,84E-03 | -2,19E+01 |
| GWP-b | kg $CO_2$ eqv. | -4,59E+00 | -1,94E-02 | 2,02E-01 | -4,40E+00 | -1,64E-02 | 4,74E+00 | 0,00E+00 | -3,59E-03 | 3,62E-03 | 6,34E-06 | 2,85E+00 |
| GWP-f | kg $CO_2$ eqv. | 3,03E+01 | 8,94E-01 | 6,71E+00 | 3,79E+01 | 7,43E-01 | 1,41E+00 | 0,00E+00 | 1,63E-01 | 1,90E+00 | 7,82E-03 | -2,47E+01 |
| GWP-luluc | kg $CO_2$ eqv. | 2,96E-02 | 9,43E-03 | 5,76E-03 | 4,48E-02 | 7,62E-03 | 4,67E-03 | 0,00E+00 | 1,67E-03 | 1,16E-03 | 2,33E-05 | -1,62E-02 |
| EP-m | kg N eqv. | 1,87E-02 | 7,52E-04 | 5,35E-03 | 2,49E-02 | 6,28E-04 | 1,84E-03 | 0,00E+00 | 4,61E-04 | 2,16E-04 | 1,09E-05 | -1,30E-02 |
| EP-fw | kg P eqv. | 3,47E-05 | 2,38E-06 | 5,45E-06 | 4,25E-05 | 2,00E-06 | 2,33E-05 | 0,00E+00 | 4,38E-07 | 7,54E-07 | 3,58E-06 | -5,67E-05 |
| EP-t | mol N eqv. | 2,02E-01 | 7,96E-03 | 5,82E-02 | 2,68E-01 | 6,64E-03 | 1,75E-02 | 0,00E+00 | 5,02E-03 | 2,78E-03 | 1,19E-04 | -1,27E-01 |
| ODP | kg CFC 11 eqv. | 1,57E-10 | 1,50E-13 | 3,12E-11 | 1,88E-10 | 1,23E-13 | 4,48E-12 | 0,00E+00 | 2,69E-14 | 8,00E-12 | 2,58E-14 | -3,15E-11 |
| POCP | kg NMVOC eqv | 6,49E-02 | 1,58E-03 | 1,45E-02 | 8,09E-02 | 1,31E-03 | 3,01E-03 | 0,00E+00 | 8,56E-04 | 5,53E-04 | 3,40E-05 | -4,99E-02 |
| ADP-f | MJ | 4,82E+02 | 1,14E+01 | 6,84E+01 | 5,62E+02 | 9,49E+00 | 1,56E+01 | 0,00E+00 | 2,08E+00 | 7,27E+00 | 1,25E-01 | -4,33E+02 |
| ADP-mm | kg Sb-eqv. | 4,85E-04 | 6,03E-08 | 3,66E-07 | 4,86E-04 | 4,92E-08 | 5,35E-07 | 0,00E+00 | 1,08E-08 | 7,32E-08 | 5,23E-10 | -8,41E-05 |
| WDP | $m^3$ world eqv. | 3,21E+00 | 4,06E-03 | 2,70E-01 | 3,48E+00 | 3,38E-03 | 6,49E-01 | 0,00E+00 | 7,42E-04 | 2,30E-01 | 9,42E-04 | -2,69E+00 |

**AP**= Acidification (AP) | **GWP-total**= Global warming potential (GWP-total) | **GWP-b**= Global warming potential - Biogenic (GWP-b) | **GWP-f**= Global warming potential - Fossil (GWP-f) | **GWP-luluc**= Global warming potential - Land use and land use change (GW**P-lul**uc) **| EP-**=Eutrophication marine (EP-m) | EP-fw= Eutrophication. freshwater (E, freshwater (EP-fw) | **EP-t**= Eutrophication, terrestrial (EP-T) | **ODP**= Ozone depletion (ODP) | **POCP**= Photochemical ozone formation - human health (POCP) | **ADP-f**= Resource use, fossils (ADP-f) | **ADP-mm**= Resource use, minerals and metals (ADP-mm) | **WDP**= Water use (WDP)

**ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS EN15804+A2**

| Abbreviation | Unit | A1 | A2 | A3 | A1-A3 | A4 | A5 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ETP-fw | CTUe | 3,73E+02 | 1,48E+01 | 2,93E+01 | 4,17E+02 | 1,23E+01 | 5,06E+00 | 0,00E+00 | 2,70E+00 | 1,26E+00 | 2,57E-01 | -1,71E+02 |
| PM | Disease incidence | 1,65E-06 | 1,45E-08 | 2,83E-07 | 1,95E-06 | 1,21E-08 | 2,63E-08 | 0,00E+00 | 5,09E-09 | 7,21E-09 | 5,17E-10 | -5,95E-07 |
| HTP-c | CTUh | 5,54E-07 | 2,00E-10 | 7,78E-10 | 5,55E-07 | 1,66E-10 | 2,73E-10 | 0,00E+00 | 3,65E-11 | 1,23E-10 | 3,59E-12 | 2,44E-09 |
| HTP-nc | CTUh | 6,80E-05 | 1,11E-08 | 2,79E-08 | 6,80E-05 | 9,30E-09 | 1,91E-08 | 0,00E+00 | 2,04E-09 | 2,42E-09 | 6,86E-11 | -3,30E-08 |
| IR | kBq U-235 eqv. | 1,40E+00 | 3,05E-03 | 8,16E-02 | 1,49E+00 | 2,57E-03 | 9,89E-02 | 0,00E+00 | 5,64E-04 | 1,86E-01 | 2,27E-04 | -8,16E-01 |
| SQP | Pt | 9,97E+02 | 5,04E+00 | 2,05E+01 | 1,02E+03 | 4,20E+00 | 1,77E+01 | 0,00E+00 | 9,20E-01 | 2,90E+00 | 2,10E-02 | -4,25E+02 |

**ETP-fw**= Ecotoxicity, freshwater (ETP-fw) | **PM**= Particulate Matter (PM) | **HTP-c**= Human toxicity, cancer (HTP-c) | **HTP-nc**= Human toxicity, non-cancer (HTP-nc) | **IR**= Ionizing radiation, human health (IR) | **SQP**= Land use (SQP)

**CLASSIFICATION OF DISCLAIMERS TO THE DECLARATION OF CORE AND ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS**

| ILCD classification | Indicator | Disclaimer |
|---|---|---|
| ILCD type / level 1 | Global warming potential (GWP) | None |
| | Depletion potential of the stratospheric ozone layer (ODP) | None |
| | Potential incidence of disease due to PM emissions (PM) | None |
| ILCD type / level 2 | Acidification potential, Accumulated Exceedance (AP) | None |
| | Eutrophication potential, Fraction of nutrients reaching freshwater end compartment (EP-freshwater) | None |
| | Eutrophication potential, Fraction of nutrients reaching marine end compartment (EP-marine) | None |
| | Eutrophication potential, Accumulated Exceedance (EP-terrestrial | None |
| | Formation potential of tropospheric ozone (POCP) | None |
| | Potential Human exposure efficiency relative to U235 (IRP) | 1 |
| ILCD type / level 3 | Abiotic depletion potential for non-fossil resources (ADP-minerals&metals) | 2 |
| | Abiotic depletion potential for fossil resources (ADP-fossil) | 2 |
| | Water (user) deprivation potential, deprivation-weighted water consumption (WDP) | 2 |
| | Potential Comparative Toxic Unit for ecosystems (ETP-fw) | 2 |
| | Potential Comparative Toxic Unit for humans (HTP-c) | 2 |
| | Potential Comparative Toxic Unit for humans (HTP-nc) | 2 |
| | Potential Soil quality index (SQP) | 2 |

**Disclaimer 1** - This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

**Disclaimer 2** - The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

## 5.2 INDICATORS DESCRIBING RESOURCE USE AND ENVIRONMENTAL INFORMATION BASED ON LIFE CYCLE INVENTORY (LCI)

**PARAMETERS DESCRIBING RESOURCE USE**

| Abbreviation | Unit | A1 | A2 | A3 | A1-A3 | A4 | A5 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PERE | MJ | 1,05E+02 | 8,60E-01 | 1,93E+01 | 1,25E+02 | 7,15E-01 | 5,29E+00 | 0,00E+00 | 1,57E-01 | 4,90E+00 | 2,13E-02 | -8,33E+01 |
| PERM | MJ | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| PERT | MJ | 1,05E+02 | 8,60E-01 | 1,93E+01 | 1,25E+02 | 7,15E-01 | 5,29E+00 | 0,00E+00 | 1,57E-01 | 4,90E+00 | 2,13E-02 | -8,33E+01 |
| PENRE | MJ | 4,82E+02 | 1,14E+01 | 6,84E+01 | 5,62E+02 | 9,49E+00 | 1,56E+01 | 0,00E+00 | 2,08E+00 | 7,27E+00 | 1,25E-01 | -4,33E+02 |
| PENRM | MJ | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| PENRT | MJ | 4,82E+02 | 1,14E+01 | 6,84E+01 | 5,62E+02 | 9,49E+00 | 1,56E+01 | 0,00E+00 | 2,08E+00 | 7,27E+00 | 1,25E-01 | -4,33E+02 |
| SM | kg | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| RSF | MJ | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| NRSF | MJ | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| FW | $m^3$ | 1,18E-01 | 4,30E-04 | 2,04E-02 | 1,39E-01 | 3,54E-04 | 1,79E-02 | 0,00E+00 | 7,75E-05 | 7,12E-03 | 2,76E-05 | -1,53E+00 |

**PERE**= renewable primary energy ex. raw materials | **PERM**= renewable primary energy used as raw materials | **PERT**= renewable primary energy total | **PENRE**= non-renewable primary energy ex. raw materials | **PENRM**= non-renewable primary energy used as raw materials | **PENRT**= non-renewable primary energy total | **SM**= use of secondary material | F=use of renewable secondary fuels | **NRSF**= use of non-renewable secondary fuels | **FW**= use of net fresh water

**OTHER ENVIRONMENTAL INFORMATION DESCRIBING WASTE CATEGORIES**

| Abbreviation | Unit | A1 | A2 | A3 | A1-A3 | A4 | A5 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HWD | kg | 5,42E-06 | 4,60E-10 | 6,31E-08 | 5,48E-06 | 3,81E-10 | 2,39E-07 | 0,00E+00 | 8,34E-11 | 9,37E-09 | 2,78E-11 | -1,59E-06 |
| NHWD | kg | 9,94E-01 | 1,59E-03 | 4,79E-02 | 1,04E+00 | 1,33E-03 | 2,17E-01 | 0,00E+00 | 2,90E-04 | 1,16E-02 | 3,04E-01 | 1,59E+00 |
| RWD | kg | 9,57E-03 | 2,14E-05 | 8,45E-04 | 1,04E-02 | 1,79E-05 | 5,99E-04 | 0,00E+00 | 3,93E-06 | 1,13E-03 | 1,73E-06 | -6,98E-03 |

**HWD**= hazardous waste disposed | **NHWD**= non-hazardous waste disposed | **RWD**= radioactive waste disposed

**ENVIRONMENTAL INFORMATION DESCRIBING OUTPUT FLOWS**

| Abbreviation | Unit | A1 | A2 | A3 | A1-A3 | A4 | A5 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CRU | kg | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| MFR | kg | 0,00E+00 | 0,00E+00 | 2,03E-01 | 2,03E-01 | 0,00E+00 | 2,24E+00 | 0,00E+00 | 0,00E+00 | 1,12E+01 | 0,00E+00 | 0,00E+00 |
| MER | kg | 0,00E+00 | 0,00E+00 | 1,26E-01 | 1,26E-01 | 0,00E+00 | 2,94E+00 | 0,00E+00 | 0,00E+00 | 4,96E-01 | 0,00E+00 | 0,00E+00 |
| EET | MJ | 0,00E+00 | 0,00E+00 | 3,98E-01 | 3,98E-01 | 0,00E+00 | 7,42E+00 | 0,00E+00 | 0,00E+00 | 5,89E+00 | 0,00E+00 | 0,00E+00 |
| EEE | MJ | 0,00E+00 | 0,00E+00 | 5,44E-01 | 5,44E-01 | 0,00E+00 | 1,22E+01 | 0,00E+00 | 0,00E+00 | 3,31E+00 | 0,00E+00 | 0,00E+00 |

**CRU**= Components for re-use | **MFR**= Materials for recycling | **MER**= Materials for energy recovery | **EET**= Exported Energy Thermic | **EEE**= Exported Energy Electric

## 5.3 INFORMATION ON BIOGENIC CARBON CONTENT PER KILOGRAM

**BIOGENIC CARBON CONTENT**

The following information describes the biogenic carbon content in the product at the factory gate per kilogram:

| Biogenic carbon content | Value | Unit |
|---|---|---|
| Biogenic carbon content in the product | 0,0000 | kg C |
| Biogenic carbon content in the final packaging | 2,3164 | kg C |

**MOUNTING BIOGENIC CARBON DIOXIDE**

The following amount of carbon dioxide absorption is taken into account. The associated mounting and release of carbon dioxide in downstream processes is not included in this figure, although it appears in the results shown. One kilogram of biogenic carbon content corresponds to 44/12 kg of biogenic carbon dioxide uptake.

| Mounting biogenic carbon dioxide | Value | Unit |
|---|---|---|
| Product | 0,0000 | kg $CO_2$ (biogenic) |
| Final packaging | 8,4936 | kg $CO_2$ (biogenic) |

# 6 Analyzing the results

## 6.1 Dominance analysis

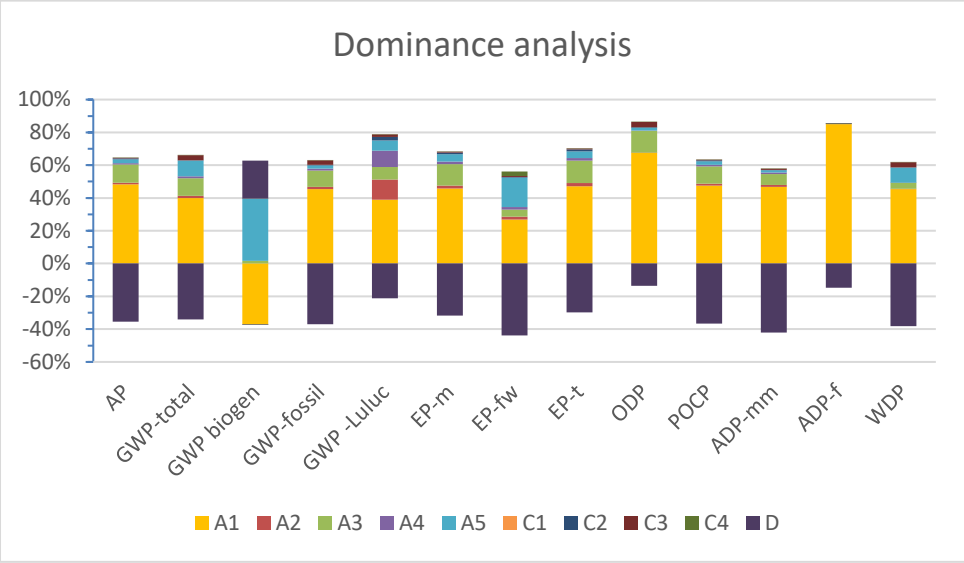



Figure 2: Dominance analysis diagram

It is clear that the impact of the raw materials used A1 is the largest in most impact categories, which is due to the petroleum-based plastics. Furthermore, the entire EoL phase (C1-C4 & D) has a negative influence on the impact categories.

# 7 References

**ISO 14040**

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**ISO 14044**

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**ISO 14025**

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**EN 15804+A2**

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**Kiwa-Ecobility Experts (Kiwa-EE)**

General Product Category Rules - Version 2.1, 2022-02- 14

**DIN EN ISO 9001**

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**MLC Database – Manufacturing and End of Life**

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