**Environmental Product Declaration (EPD)**
According to ISO 14025 and EN 15804

# PhoneStar panel

| | |
|---|---|
| Registration number: | EPD-Kiwa-EE-165719-EN |
| Issue date: | 08-04-2025 |
| Valid until: | 08-04-2030 |
| Declaration owner: | Wolf Bavaria GmbH |
| Publisher: | Kiwa-Ecobility Experts |
| Programme operator: | Kiwa-Ecobility Experts |
| Status: | verified |

# 1 General information

## 1.1 PRODUCT

PhoneStar panel

## 1.2 REGISTRATION NUMBER

EPD-Kiwa-EE-165719-EN

## 1.3 VALIDITY

**Issue date:** 08-04-2025

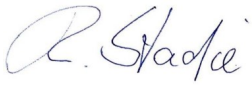
**Valid until:** 08-04-2030

## 1.4 PROGRAMME OPERATOR

Kiwa-Ecobility Experts
Wattstraße 11-13
13355 Berlin
DE

Raoul Mancke

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



Dr. Ronny Stadie

*(Verification body, Kiwa-Ecobility Experts)*

## 1.5 OWNER OF THE DECLARATION

**Manufacturer:** Wolf Bavaria GmbH

**Address:** Gutenbergstraße 8, 91560 Heilsbronn, Germany

**E-mail:** info@wolf-bavaria.com

**Website:** https://www.wolf-bavaria.com/

**Production location:** Wolf Bavaria GmbH

**Address production location:** Gutenbergstrasse 8, 91560 Heilsbronn, Germany

## 1.6 VERIFICATION OF THE DECLARATION

The independent verification is in accordance with the 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

## 1.7 STATEMENTS

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

## 1.8 PRODUCT CATEGORY RULES

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

Kiwa-Ecobility Experts (Kiwa-EE) - PCR B acoustical ceiling, wall and floor solutions (draft) (29.03.2023)

## 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+A2. 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

# 1 General information

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 EPD program operators 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 CALCULATION BASIS

**LCA method R<THINK:** Ecobility Experts | EN15804+A2

**LCA software*:** Simapro 9.1

**Characterization method:** EN 15804 +A2 Method v1.0

**LCA database profiles:** EcoInvent version 3.6

**Version database:** v3.19 (20250306)

** Simapro is used for calculating the characterized results of the Environmental profiles within R<THINK.*

## 1.11 LCA BACKGROUND REPORT

This EPD is generated on the basis of the LCA background report 'PhoneStar panel' with the calculation identifier ReTHiNK-65719.

# 2 Product

## 2.1 PRODUCT DESCRIPTION

PhoneStar panels are made of corrugated cardboard. Their cavities are filled with a mixture of dry silica sand. The cut edges are sealed with adhesive tape. The product is used for sound insulation. The loose, heavy quartz sand filling and its multi-layered structure dampens the intensity of the sound waves and reducing noise levels.

| Material | Composition |
|---|---|
| corrugated cardboard | ~7.8% |
| silica sand | ~92% |
| adhesive tape | ~0.2% |

## 2.2 APPLICATION (INTENDED USE OF THE PRODUCT)

PhoneStar panels are used as sound insulation and dry screed in floors, as well as sound insulation in walls, ceilings and roofs. They are not statically reinforcing panels for cladding and covering building components. PhoneStar panels may only be used as additional panels under the surface board of interior floors, walls and ceilings to improve the acoustic performance. PhoneStar panels must not be the final layer. On floors, PhoneStar require a final layer or a dry screed, underfloor heating elements or a wet screed. On walls, ceilings and roofs, it is necessary to screw and/or glue any type of plasterboard, cement board, wood planks or wood-based panels through PhoneStar.

## 2.3 REFERENCE SERVICE LIFE

### RSL PRODUCT

According to the “Nutzungsdauern von Bauteilen für die Lebenszyklusanalysen nach dem Bewertungssystem Nachhaltiges Bauen BBSR"-table from 2017, the reference service life of acoustic elements is 40 years.

### USED RSL (YR) IN THIS LCA CALCULATION:

40

## 2.4 TECHNICAL DATA

| Characteristic | Data | Norm |
|---|---|---|
| Thickness | 15 mm | |
| Impact noise reduction until | Δ Lw = 22 dB | EN ISO 717-2 |
| Sound insulation index | Rw = 38 dB | EN ISO 717-1 |
| Distributed load | 5 kN/m2 | EN 1991-1-1NA |
| Point load | 4 kN | EN 1991-1-1NA |
| Sd value | ~ 0.2 m | EN ISO 12572 |
| Thermal conductivity | 0,17 W/(mK) | EN 12664 |
| Compressive stress at 5% load | ≥ 1000 | -/- |
| Compressive strength | ≥ 1000 | -/- |
| Safety in case of fire | Class E | EN 13501-1 |
| Water vapour permeability | factor μ 14 - 17 | EN ISO 12572 |

## 2.5 SUBSTANCES OF VERY HIGH CONCERN

The product does not contain any substances from the “Candidate List of "Substances of very high concern” (SVHC).

## 2.6 DESCRIPTION PRODUCTION PROCESS

The corrugated cardboard is cut into the ordered size with a circular saw. Three of the four sides are then taped off by hand. Then, the silica sand is filled into the panel and then evened out with a vibrating table. Lastly, the fourth side is taped off.

# 2 Product

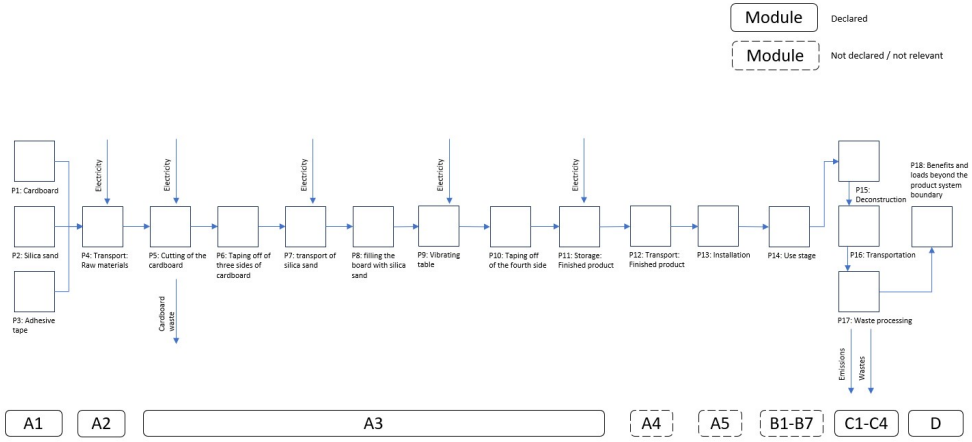



Figure 1. Simplified process flow chart of the production of PhoneStar

# 3 Calculation rules

## 3.1 DECLARED UNIT

**m²**

One m² of a PhoneStar panel

Despite being listed in the PCR, no sound absorption class according to EN 11654 can be named due to it not having been classified for the product.

Reference unit: square meter (m2)

## 3.2 CONVERSION FACTORS

| Description | Value | Unit |
|---|---|---|
| Reference unit | 1 | m2 |
| Weight per reference unit | 17.400 | kg |
| Conversion factor to 1 kg | 0.057471 | m2 |

## 3.3 SCOPE OF DECLARATION AND SYSTEM BOUNDARIES

This is a Cradle to gate with modules C1-C4 and module D EPD. The life cycle stages included are as shown below:

(X = module included, ND = module not declared)

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

The modules of the EN15804 contain the following:

| | |
|---|---|
| Module A1 = Raw material supply | Module B5 = Refurbishment |
| Module A2 = Transport | Module B6 = Operational energy use |
| Module A3 = Manufacturing | Module B7 = Operational water use |
| Module A4 = Transport | Module C1 = De-construction / Demolition |
| Module A5 = Construction - Installation process | Module C2 = Transport |
| Module B1 = Use | Module C3 = Waste Processing |
| Module B2 = Maintenance | Module C4 = Disposal |
| Module B3 = Repair | Module D = Benefits and loads beyond the product system boundaries |
| Module B4 = Replacement | |

## 3.4 REPRESENTATIVENESS

This EPD is representative for PhoneStar, a product of Wolf Bavaria GmbH. The results of this EPD are representative for Germany.

## 3.5 CUT-OFF CRITERIA

**Product stage (A1-A3)**
All input flows (e.g. raw materials, transportation, energy use, packaging, etc.) and output flows (e.g. production waste) are considered in this LCA. The total neglected input flows do therefore not exceed the limit of 5% of energy use and mass. Specifically, this calculation does not take into account the manufacturing process of the plants, buildings and other

# 3 Calculation rules

capital goods used in the production processes. The transport of personnel to the plant, within the plant, research and development activities and long-term emissions were also not taken into account. Furthermore, the plastic suspenders used to fixate the product on the pallet have been excluded, as an exact amount used per m² of product couldn't be determined.

**End of life stage (C1-C4)**
All input flows (e.g. energy use for demolition or disassembly, transport to waste processing, etc.) and output flows (e.g. end-of-life waste processing of the product, etc.) are considered in this LCA. The total neglected input flows do therefore not exceed the limit of 5% of energy use and mass.

**Benefits and loads beyond the system boundary (Module D)**
All benefits and loads beyond the system boundary resulting from reusable products, recyclable materials and/or useful energy carriers leaving the product system are considered in this LCA.

## 3.6 ALLOCATION

Allocations were avoided as far as possible. There are no coproducts or by-product in the manufacturing of the examined product. Based on energy consumption measurements, the energy requirements of the production were allocated to the individual production processes. Specific information about allocations within the background data is included in the documentation of the Ecoinvent datasets.

## 3.7 DATA COLLECTION & REFERENCE PERIOD

Primary data was collected and provided by Wolf Bavaria internally. The data has been collected for the period of the 1st of January 2023 to the 31st of December 2023..

The transport distances are based on the distances between the production site and the suppliers used in 2023.

Electricity consumption was measured for every production process and then calculated based on the time needed to operate the machine to produce 1 m² of the product.

## 3.8 ESTIMATES AND ASSUMPTIONS

The distances from the place of use to the respective waste treatment (Transport End-of-Life) are taken from the LCA calculation software R<THINK, which works with the distances from the National Environmental Database (NMD) of the Netherlands.

There are no inputs for C1, as the De-construction of the product is done by hand and energy usage, like the operation of a battery-powered screwdriver, are neglectible.

## 3.9 DATA QUALITY

The quality level of geographical representativeness can be regarded as "good".
The quality level of technical representativeness can be regarded as "good".
The time representativeness can also be regarded as "good".
The overall data quality for this EPD can therefore be described as "good".

All relevant process-specific data was collected in the internal controlling.

In all possible cases, primary data from customers was used, which is of good quality. In addition, secondary data from the Ecoinvent database (2019, version 3.6) was used when no primary data could be supplied. The database is checked regularly and, therefore, fulfils the requirements of DIN EN ISO 14040/44 (background data not older than 10 years). The background data meets the requirements of EN 15804+A2. The

The quantities of raw materials, consumables and supplies used and the energy were recorded and with this the material usage for the declared unit determined. The general rule that specific data from certain production processes or average data derived from specific processes must have priority when calculating an EPD or LCA, was adhered to. Data for processes over which the manufacturer has no influence were assigned to generic data/scenarios. When selecting these, the data set/scenario that most realistically represents the processes was selected.

## 3.10 POWER MIX

100% of the energy used in production is generated through the PV panels on the company roof. Thus, the energy consumption is measured after the location-based approach. The rest of the generated energy is fed into the power grid.
The GWP-total of the applied electricity mix is 0.0267 kg CO2 eqv. per kWh.

# 4 Scenarios and additional technical information

## 4.1 DE-CONSTRUCTION, DEMOLITION (C1)

No inputs are needed for the product at the de-construction / demolition phase

## 4.2 TRANSPORT END-OF-LIFE (C2)

The following distances and transport conveyance are assumed for transportation during end of life for the different types of waste processing.

| Waste Scenario | Transport conveyance | Not removed (stays in work) [km] | Landfill [km] | Incineration [km] | Recycling [km] | Re-use [km] |
|---|---|---|---|---|---|---|
| (ei3.6) Corrugated board / Core board (PEF scenario) \| (u=10%, glue=2%) corr. acc. EN16449 | (ei3.6) Lorry (Truck), unspecified (default) \| market group for (GLO) | 0 | 100 | 150 | 50 | 0 |
| (ei3.6) sand, soil (NMD ID 85) | (ei3.6) Lorry (Truck), unspecified (default) \| market group for (GLO) | 0 | 100 | 150 | 50 | 0 |
| (ei3.6) PVC, pipes (NMD ID 64) | (ei3.6) Lorry (Truck), unspecified (default) \| market group for (GLO) | 0 | 100 | 150 | 50 | 0 |

The transport conveyance(s) used in the scenario(s) for transport during end of life has the following characteristics.

| | Value and unit |
|---|---|
| Vehicle type used for transport | (ei3.6) Lorry (Truck), unspecified (default) \| market group for (GLO) |
| Fuel type and consumption of vehicle | not available |
| Capacity utilisation (including empty returns) | 50 % (loaded up and return empty) |
| Bulk density of transported products | inapplicable |
| Volume capacity utilisation factor | 1 |

## 4.3 END OF LIFE (C3, C4)

The scenario(s) assumed for end of life of the product are given in the following tables.
First the assumed percentages per type of waste processing are displayed, followed by the assumed amounts.

# 4 Scenarios and additional technical information

| Waste Scenario | Region | Not removed (stays in work) [%] | Landfill [%] | Incineration [%] | Recycling [%] | Re-use [%] |
|---|---|---|---|---|---|---|
| (ei3.6) Corrugated board / Core board (PEF scenario) \| (u=10%, glue=2%) corr. acc. EN16449 | NL | 0 | 0 | 25 | 75 | 0 |
| (ei3.6) sand, soil (NMD ID 85) | NL | 0 | 1 | 0 | 0 | 99 |
| (ei3.6) PVC, pipes (NMD ID 64) | NL | 0 | 10 | 20 | 70 | 0 |

| Waste Scenario | Not removed (stays in work) [kg] | Landfill [kg] | Incineration [kg] | Recycling [kg] | Re-use [kg] |
|---|---|---|---|---|---|
| (ei3.6) Corrugated board / Core board (PEF scenario) \| (u=10%, glue=2%) corr. acc. EN16449 | 0.000 | 0.000 | 0.338 | 1.012 | 0.000 |
| (ei3.6) sand, soil (NMD ID 85) | 0.000 | 0.160 | 0.000 | 0.000 | 15.840 |
| (ei3.6) PVC, pipes (NMD ID 64) | 0.000 | 0.005 | 0.010 | 0.035 | 0.000 |
| **Total** | **0.000** | **0.165** | **0.348** | **1.047** | **15.840** |

## 4.4 BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY (D)

The presented Benefits and loads beyond the system boundary in this EPD are based on the following calculated Net output flows in kilograms and Energy recovery displayed in MJ Lower Heating Value.

| Waste Scenario | Net output flow [kg] | Energy recovery [MJ] |
|---|---|---|
| (ei3.6) Corrugated board / Core board (PEF scenario) \| (u=10%, glue=2%) corr. acc. EN16449 | 1.012 | 5.373 |
| (ei3.6) sand, soil (NMD ID 85) | 15.840 | 0.000 |
| (ei3.6) PVC, pipes (NMD ID 64) | 0.035 | 0.215 |
| **Total** | **16.887** | **5.588** |

# 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 end-points 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 SQUARE METER

### CORE ENVIRONMENTAL IMPACT INDICATORS EN15804+A2

| Abbr. | Unit | A1 | A2 | A3 | A1-A3 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|
| GWP-total | kg $CO_2$ eq. | -2.52E-1 | 2.39E-1 | -4.34E-1 | -4.47E-1 | 0.00E+0 | 1.63E-2 | 2.32E+0 | 1.26E-3 | -1.69E-1 |
| GWP-f | kg $CO_2$ eq. | 1.96E+0 | 2.39E-1 | 3.12E-1 | 2.51E+0 | 0.00E+0 | 1.63E-2 | 1.06E-1 | 1.26E-3 | -1.67E-1 |
| GWP-b | kg $CO_2$ eq. | -2.22E+0 | 9.63E-5 | -7.48E-1 | -2.97E+0 | 0.00E+0 | 6.58E-6 | 2.22E+0 | 9.70E-7 | -7.36E-4 |
| GWP-luluc | kg $CO_2$ eq. | 1.28E-2 | 8.76E-5 | 1.93E-3 | 1.48E-2 | 0.00E+0 | 5.99E-6 | 4.09E-5 | 2.60E-7 | -9.08E-4 |
| ODP | kg CFC 11 eq. | 2.36E-7 | 5.27E-8 | 3.42E-8 | 3.23E-7 | 0.00E+0 | 3.61E-9 | 1.57E-8 | 3.63E-10 | -4.65E-8 |
| AP | mol H+ eq. | 1.03E-2 | 1.39E-3 | 1.58E-3 | 1.32E-2 | 0.00E+0 | 9.47E-5 | 5.38E-4 | 8.46E-6 | -1.55E-3 |
| EP-fw | kg P eq. | 9.06E-5 | 2.41E-6 | 1.50E-5 | 1.08E-4 | 0.00E+0 | 1.65E-7 | 1.74E-6 | 1.04E-8 | -1.03E-5 |
| EP-m | kg N eq. | 3.00E-3 | 4.88E-4 | 4.87E-4 | 3.98E-3 | 0.00E+0 | 3.34E-5 | 1.93E-4 | 3.01E-6 | -4.35E-4 |
| EP-T | mol N eq. | 2.63E-2 | 5.38E-3 | 4.50E-3 | 3.62E-2 | 0.00E+0 | 3.68E-4 | 2.09E-3 | 3.20E-5 | -5.99E-3 |
| POCP | kg NMVOC eq. | 6.86E-3 | 1.54E-3 | 1.49E-3 | 9.89E-3 | 0.00E+0 | 1.05E-4 | 6.46E-4 | 9.38E-6 | -1.43E-3 |
| ADP-mm | kg Sb-eq. | 1.15E-5 | 6.05E-6 | 3.21E-6 | 2.08E-5 | 0.00E+0 | 4.14E-7 | 2.33E-6 | 8.28E-9 | -5.21E-6 |
| ADP-f | MJ | 2.61E+1 | 3.60E+0 | 4.69E+0 | 3.44E+1 | 0.00E+0 | 2.46E-1 | 9.41E-1 | 2.48E-2 | -2.78E+0 |
| WDP | m3 world eq. | 1.13E+0 | 1.29E-2 | 7.00E-2 | 1.21E+0 | 0.00E+0 | 8.81E-4 | 1.68E-2 | 1.11E-3 | -1.04E+0 |

**GWP-total**=Global Warming Potential total (GWP-total) | **GWP-f**=Global Warming Potential fossil fuels (GWP-fossil) | **GWP-b**=Global Warming Potential biogenic (GWP-biogenic) | **GWP-luluc**=Global Warming Potential land use and land use change (GWP-luluc) | **ODP**=Depletion potential of the stratosperic ozon layer (ODP) | **AP**=Acidification potential, Accumulated Exceedance (AP) | **EP-fw**=Eutrophication potential, fraction of nutrients reaching freshwater end compartment (EP-freshwater) | **EP-m**=Eutrophication potential, fraction of nutrients reaching marine end compartment (EP-marine) | **EP-T**=Eutrophication potential, Accumulated Exceedance (EP-terrestrial) | **POCP**=Formation potential of tropospheric ozone (POCP) | **ADP-mm**=Abiotic depletion potential for non fossil resources (ADP mm) | **ADP-f**=Abiotic depletion for fossil resources potential (ADP fossil) | **WDP**=Water (user) deprication potential, deprivation-weighted water consumption (WDP)

# 5 Results

### ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS EN15804+A2

| Abbr. | Unit | A1 | A2 | A3 | A1-A3 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|
| PM | disease incidence | 1.09E-7 | 2.14E-8 | 2.57E-8 | 1.56E-7 | 0.00E+0 | 1.46E-9 | 7.96E-9 | 1.64E-10 | -2.11E-8 |
| IR | kBq U235 eq. | 5.47E-2 | 1.51E-2 | 1.13E-2 | 8.11E-2 | 0.00E+0 | 1.03E-3 | 4.02E-3 | 1.02E-4 | -8.56E-3 |
| ETP-fw | CTUe | 8.99E+1 | 3.21E+0 | 1.28E+1 | 1.06E+2 | 0.00E+0 | 2.20E-1 | 3.72E+0 | 3.46E-2 | -9.51E+0 |
| HTP-c | CTUh | 1.03E-9 | 1.04E-10 | 4.60E-10 | 1.60E-9 | 0.00E+0 | 7.13E-12 | 1.87E-10 | 3.90E-13 | -1.81E-10 |
| HTP-nc | CTUh | 2.44E-8 | 3.52E-9 | 5.04E-9 | 3.30E-8 | 0.00E+0 | 2.41E-10 | 2.18E-9 | 1.47E-11 | -5.90E-9 |
| SQP | Pt | 7.40E+1 | 3.12E+0 | 7.25E+1 | 1.50E+2 | 0.00E+0 | 2.14E-1 | 3.67E-1 | 5.24E-2 | -9.66E+1 |

**PM**=Potential incidence of disease due to PM emissions (PM) | **IR**=Potential Human exposure efficiency relative to U235 (IRP) | **ETP-fw**=Potential Comparative Toxic Unit for ecosystems (ETP-fw) | **HTP-c**=Potential Comparative Toxic Unit for humans (HTP-c) | **HTP-nc**=Potential Comparative Toxic Unit for humans (HTP-nc) | **SQP**=Potential soil quality idex (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 |

# 5 Results

| ILCD classification | Indicator | Disclaimer |
|---|---|---|
| | 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

| Abbr. | Unit | A1 | A2 | A3 | A1-A3 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|
| PERE | MJ | -9.48E+0 | 4.51E-2 | 3.45E+0 | -5.99E+0 | 0.00E+0 | 3.08E-3 | 4.61E-2 | 2.12E-4 | -1.76E+1 |
| PERM | MJ | 2.15E+1 | 0.00E+0 | 7.37E+0 | 2.89E+1 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 |
| PERT | MJ | 1.20E+1 | 4.51E-2 | 1.08E+1 | 2.29E+1 | 0.00E+0 | 3.08E-3 | 4.61E-2 | 2.12E-4 | -1.76E+1 |
| PENRE | MJ | 2.71E+1 | 3.82E+0 | 5.02E+0 | 3.60E+1 | 0.00E+0 | 2.61E-1 | 9.99E-1 | 2.63E-2 | -2.47E+0 |
| PENRM | MJ | 1.08E+0 | 0.00E+0 | 1.71E-2 | 1.09E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | -5.04E-1 |
| PENRT | MJ | 2.82E+1 | 3.82E+0 | 5.04E+0 | 3.71E+1 | 0.00E+0 | 2.61E-1 | 9.99E-1 | 2.63E-2 | -2.98E+0 |
| SM | Kg | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 |
| RSF | MJ | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 |
| NRSF | MJ | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 |
| FW | $m^3$ | 3.01E-2 | 4.39E-4 | 2.32E-3 | 3.29E-2 | 0.00E+0 | 3.00E-5 | 6.49E-4 | 2.65E-5 | -2.34E-2 |

**PERE**=Use of renewable primary energy excluding renewable primary energy resources used as raw materials | **PERM**=Use of renewable primary energy resources used as raw materials | **PERT**=Total use of renewable primary energy resources | **PENRE**=Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials | **PENRM**=Use of non-renewable primary energy resources used as raw materials | **PENRT**=Total use of non-renewable primary energy resources | **SM**=Use of secondary material | **RSF**=Use of renewable secondary fuels | **NRSF**=Use of non-renewable secondary fuels | **FW**=Net use of fresh water

# 5 Results

## OTHER ENVIRONMENTAL INFORMATION DESCRIBING WASTE CATEGORIES

| Abbr. | Unit | A1 | A2 | A3 | A1-A3 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|
| HWD | Kg | 3.99E-5 | 9.13E-6 | 1.04E-5 | 5.94E-5 | 0.00E+0 | 6.24E-7 | 2.41E-6 | 3.71E-8 | -5.13E-6 |
| NHWD | Kg | 3.93E-1 | 2.28E-1 | 8.97E-2 | 7.12E-1 | 0.00E+0 | 1.56E-2 | 3.74E-1 | 1.65E-1 | -3.47E-2 |
| RWD | Kg | 6.20E-5 | 2.37E-5 | 1.29E-5 | 9.86E-5 | 0.00E+0 | 1.62E-6 | 5.27E-6 | 1.62E-7 | -9.90E-6 |

**HWD**=Hazardous waste disposed | **NHWD**=Non-hazardous waste disposed | **RWD**=Radioactive waste disposed

## ENVIRONMENTAL INFORMATION DESCRIBING OUTPUT FLOWS

| Abbr. | Unit | A1 | A2 | A3 | A1-A3 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|
| CRU | Kg | 0.00E+0 | 0.00E+0 | 1.58E-3 | 1.58E-3 | 0.00E+0 | 0.00E+0 | 1.58E+1 | 0.00E+0 | 0.00E+0 |
| MFR | Kg | 0.00E+0 | 0.00E+0 | 4.16E-2 | 4.16E-2 | 0.00E+0 | 0.00E+0 | 1.05E+0 | 0.00E+0 | 0.00E+0 |
| MER | Kg | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 |
| EET | MJ | 0.00E+0 | 0.00E+0 | 6.86E-2 | 6.86E-2 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 1.73E+0 |
| EEE | MJ | 0.00E+0 | 0.00E+0 | 3.98E-2 | 3.98E-2 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 1.01E+0 |

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

# 5 Results

## 5.3 INFORMATION ON BIOGENIC CARBON CONTENT PER SQUARE METER

### BIOGENIC CARBON CONTENT

The following Information describes the biogenic carbon content in (the main parts of) the product at the factory gate per square meter:

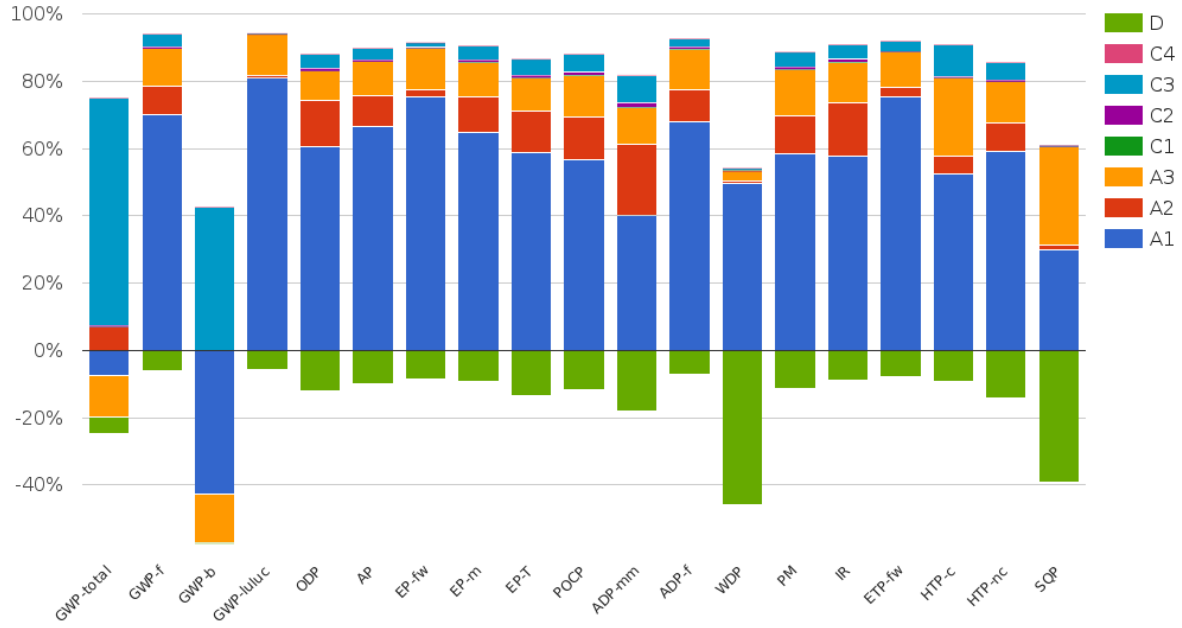
| Biogenic carbon content | Amount | Unit |
|---|---|---|
| Biogenic carbon content in the product | 0.6136 | kg C |
| Biogenic carbon content in accompanying packaging | 0.2045 | kg C |

### UPTAKE OF BIOGENIC CARBON DIOXIDE

The following amount of carbon dioxide uptake is taken into account. Related uptake and release of carbon dioxide in downstream processes are not taken into account in this number although they do appear in the presented results. One kilogram of biogenic Carbon content is equivalent to 44/12 kg of biogenic carbon dioxide uptake.

| Uptake Biogenic Carbon dioxide | Amount | Unit |
|---|---|---|
| product | 2.25 | kg CO2 (biogenic) |
| Packaging | 0.75 | kg CO2 (biogenic) |

# 6 Interpretation of results




The main driver is almost all impact categories is A1 with is corrugated cardboard and the silica sand. It is responsible for between 30% up to close to 80% of environmental impact. Another significant impactor is A3, with an especially high value in land use (SQP). Stemming from the palet and the usage of cardboard in the product and packaging, D has a significant negative impact for land use (SQP) and water depletion potential (WDP). Due to cardboard being a main component of the product, global warming potential - biogenic (GWP-b), is also shown to be -40%. This is then evened out due to the waste processing in C3. The other biogenic carbon emissions originate from the packaging. Since the module A5, which includes the waste processing of packaging, is not declared there seems to be a disbalance of biogenic CO2 emissions.

# 7 References

**ISO 14040**
ISO 14040:2006-10, Environmental management - Life cycle assessment - Principles and framework; EN ISO 14040:2006

**ISO 14044**
ISO 14044:2006-10, Environmental management - Life cycle assessment - Requirements and guidelines; EN ISO 14044:2006

**ISO 14025**
ISO 14025:2011-10: Environmental labels and declarations — Type III environmental declarations — Principles and procedures

**EN 15804+A2**
EN 15804+A2: 2019: Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products

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

**Additional PCR Ecobility Experts**
Kiwa-Ecobility Experts (Kiwa-EE) - PCR B acoustical ceiling, wall and floor solutions (draft) (29.03.2023)

**Reference service life**
Nutzungsdauern von Bauteilen für Lebenszyklusanalysen nach Bewertungssystem Nachhaltiges Bauen (BNB)

**EN ISO 717-1**
Acoustics - Rating of sound insulation in buildings and of building elements - Part 1: Airborne sound insulation (ISO 717-1:2020)

**EN ISO 717-2**
Acoustics - Rating of sound insulation in buildings and of building elements - Part 2: Impact sound insulation (ISO 717-2:2020)

**EN 1991-1-1NA**
Eurocode 1: Actions on structures - Part 1-1: General actions - Densities, self-weight, imposed loads for buildings

**EN ISO 12572**
Hygrothermal performance of building materials and products - Determination of water vapour transmission properties - Cup method (ISO 12572:2016)

**EN 12664**
Thermal performance of building materials and products - Determination of thermal resistance by means of guarded hot plate and heat flow meter methods - Dry and moist products with medium and low thermal resistance

# 7 References

**EN 13501-1**
Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests

**NMD**
NATIONAL ENVIRONMENTAL DATABASE

**ecoinvent database version 3.6**

# 8 Contact information

| Publisher | Operator | Owner of declaration |
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Kiwa-Ecobility Experts is established member of the ECO PLATFORM