Environmental Product Declaration (EPD)
According to ISO 14025 and EN 15804+A2:2019

AQUATUB-Rw / AQUADRAIN

Registration number:	EPD-Kiwa-EE-226704-EN
Issue date:	06-01-2026
Valid until:	06-01-2031
Declaration owner:	HEGLER PLASTIK GmbH
Publisher:	Kiwa-Ecobility Experts
Programme operator:	Kiwa-Ecobility Experts
Status:	verified

1 General information

1.1 PRODUCT

AQUATUB-Rw / AQUADRAIN

1.2 REGISTRATION NUMBER

EPD-Kiwa-EE-226704-EN

1.3 VALIDITY

Issue date: 06-01-2026

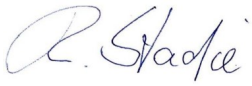
Valid until: 06-01-2031

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

Declaration owner: HEGLER PLASTIK GmbH

Address: Heglerstraße 8, 97714 Oerlenbach, Germany

E-mail: info@hegler.de

Website: www.hegler.de

Production location: HEGLER PLASTIK GmbH

Address production location: Heglerstraße 8, 97714 Oerlenbach, 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+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-EE GPI R.3.0 (2025)
Kiwa-Ecobility Experts, General Programme Instructions “Product Level”, SOP EE 1201_R.3.0 (03.06.2025)

Kiwa-EE GPI R.3.0 Annex B1 (2025)
Kiwa-Ecobility Experts, General Programme Instructions “Product Level” – Annex B1 Environmental Information Programme according to EN 15804 / ISO 21930 , SOP EE 1203_R.3.0 (03.06.2025)

Specific PCR
DIN EN 16903 - Product Category Rules complementary to EN 15804, for buried plastics piping systems prEN 16903:2021 (2022.10.22)

1 General information

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+A2:2019. 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 EPD program operators may differ. Comparability needs to be evaluated. For further guidance, see EN 15804+A2:2019 and ISO 14025.

1.10 CALCULATION BASIS

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

LCA software*: Simapro 9.6

Characterization method: RETHINK characterization method (see references for more details)

LCA database profiles: ecoinvent (for version see references)

Version database: v3.20b (2025-11-18)

** 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 'AQUATUB-Rw / AQUADRAIN ' with the calculation identifier ReTHiNK-126704.

2 Product

2.1 PRODUCT DESCRIPTION

The two product groups are identical in design and differ only in the slotted and unslotted design; AQUATUB-Rw being unslotted and AUQADRAIN slotted.

This EPD covers the product groups AQUATUB-Rw and AQUADRAIN and is based on the representative LCA data of the product variant AQUATUB-Rw with a nominal diameter of 300 mm.

As the product is available in different variants with only very small differences in composition the results of this EPD can be converted using the conversion factors in the table below.

The EPD contains data for the following product variants:

DN [mm]	Weight / m [g]	Conversion factor
AQUATUB-RW		
150	1,500	0.303
200	2,450	0.495
250	4,000	0.808
300	4,950	1.000
350	6,950	1.404
400	8,400	1.697
500	13,100	2.646
600	19,700	3.980
800	33,700	6.808
AQUADRAIN		
150	1,525	0.308
200	2,493	0.504
250	4,065	0.821
300	5,043	1.019
400	8,494	1.716
500	13,100	2.646
600	19,700	3.980

AQUATUB-Rw and AQUADRAIN are polyethylene pipe systems used for various applications in drainage measures in infrastructure and traffic route construction as transport and drainage pipes for discharging or collecting surface water. The pipe geometry is described as a twin wall pipe with a smooth inner wall and a profiled outer wall. The pipe systems are available in nominal diameters from DN 150 to DN 800 (AQUADRAIN up to DN 600) in lengths of 3.0 m and 6.0 m. The pipes are connected using a push-in system with a socket.

Material	~ % material in composition (mass)
PE HD (secondary)	70
PE HD (primary)	30
Masterbatch	<1

2.2 APPLICATION (INTENDED USE OF THE PRODUCT)

The scope of application for the AQUATUB-Rw and AQUADRAIN pipe systems is:

- Transport of surface water in infrastructure projects and in traffic route construction
- Retention system as a storage sewer
- Water piping / road crossings
- Seepage pipe for collecting and draining surface water / drainage

The following material characteristics and production specifications are adhered to in the manufacture of AQUATUB-Rw and AQUADRAIN pipe systems, which is ensured by a process-oriented quality management system:

- Polyethylene pellets (PE-HD) in accordance with normative definition
- DIN 16961
- DIN 4262-1 (type R2)
- DIN EN ISO 9969

2.3 REFERENCE SERVICE LIFE

RSL PRODUCT

According to the used secondary PCR the reference service life for plastic pipes is 50 years.

USED RSL (YR) IN THIS LCA CALCULATION:

50

2 Product

2.4 TECHNICAL DATA

AQUATUB-Rw			
DN	Outside diameter [mm]	Inside diameter [mm]	Ring Stiffness [kN/m²]
150	174.8	153.5	≥ 8.0
200	234.9	204.5	≥ 8.0
250	293.5	255.5	≥ 8.0
300	353.4	300.5	≥ 8.0
350	399.8	345.0	≥ 8.0
400	464.0	396.0	≥ 8.0
500	579.5	498.0	≥ 8.0
600	691.9	594.0	≥ 8.0
800	919.3	791.0	≥ 8.0

AQUADRAIN				
DN	Outside diameter [mm]	Inside diameter [mm]	Ring Stiffness [kN/m²]	Water Inlet Surface TP [cm²/m]
150	174.8	153.5	≥ 8.0	168
200	234.9	204.5	≥ 8.0	214
250	293.5	255.5	≥ 8.0	209
300	353.4	300.5	≥ 8.0	328
400	464.0	396.0	≥ 8.0	237
500	579.5	498.0	≥ 8.0	367
600	691.9	594.0	≥ 8.0	290

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) in quantities of more than 0.1% (1,000 ppm).

2.6 DESCRIPTION PRODUCTION PROCESS

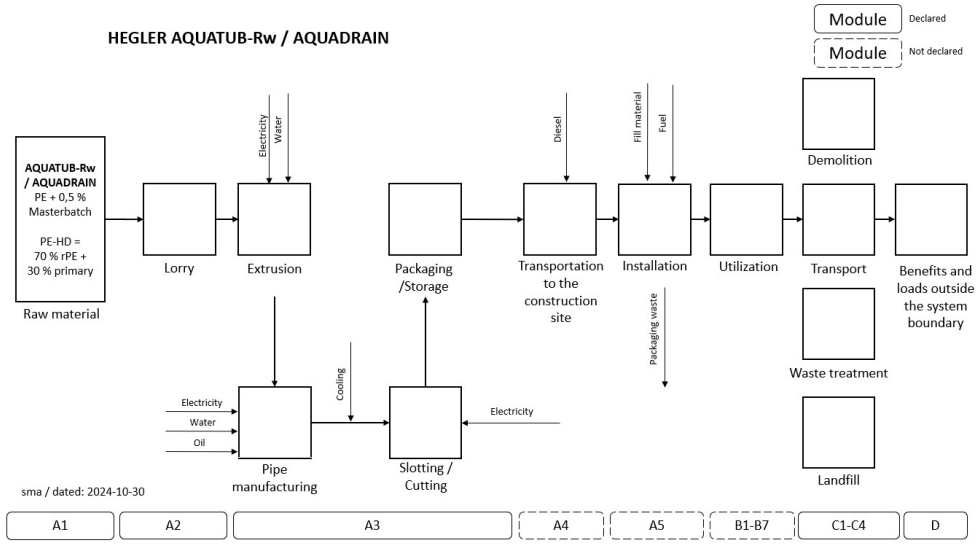
The twin wall pipe types described in this EPD are manufactured using the extrusion principle such as the endless chain method or the block moving method.
The production line consists of material feed – extruder – extrusion die – corrugator (vacuum technology) – cooling section – conveyor - planetary slotting machine (optional) – cutting device

Process steps in the coextrusion process:

- Melting of the thermoplastic resin including the associated additives in the extruder
- Production of a tubular melt in the extrusion die
- Continuous shaping/forming of the twin wall pipe geometry in the corrugator with product-specific mould blocks using the vacuum technology
- Cooling of the twin wall pipes
- Cutting of the water inlets using a planetary slotting machine (optional)
- Cutting the twin wall pipes to the desired length and subsequent palletising

Additional processing step Slotting with AQUADRAIN:

After the cooling process, the AQUADRAIN pipe is slotted with the defined water inlets in a single step, depending on the type of product. The removed material is collected and returned to the extrusion process.



2 Product

2.7 CONSTRUCTION DESCRIPTION

Following the factory production process, the pipes are palletised/packed and temporarily stored in the warehouse until delivery. Further delivery to the construction site or retailer is carried out by a contracted trucking company after receipt of the order. The AQUATUB-Rw and AQUADRAIN pipe types are laid at the construction site in open trench construction in accordance with the applicable regulations. After the trench has been properly backfilled, the planned surface (sealing) is created. This completes the installation of the pipe systems and ensures that they are functional for the corresponding area of application.

3 Calculation rules

3.1 DECLARED UNIT

m

1 meter of AQUATUB-Rw / AQUADRAIN with a diameter of 300 mm

Reference unit: meter (m^1)

3.2 CONVERSION FACTORS

Description	Value	Unit
Reference unit	1	m^1
Weight per reference unit	4.950	kg
Conversion factor to 1 kg	0.202020	m^1

3.3 SCOPE OF DECLARATION AND SYSTEM BOUNDARIES

This is a Cradle to gate with options, 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	X	X	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X

The modules of the EN 15804 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 AQUATUB-Rw / AQUADRAIN , a product of HEGLER PLASTIK 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.

3 Calculation rules

Excluded processes/inputs are:

- Long-term emissions
- The manufacture of equipment used in production, buildings or any other capital goods;
- The transport of personnel to the plant;
- The transportation of personnel within the plant;
- Research and development activities

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 products. Double counting was avoided. Specific information about allocations within the background data is included in the documentation of the ecoinvent datasets.

3.7 DATA COLLECTION & REFERENCE PERIOD

All process-specific data was collected for the period from 1 January 2023 to 31 December 2023. The quantities of raw materials and supplies used, as well as energy consumption, were recorded and averaged over the entire operating period. The reference area is Germany.

3.8 ESTIMATES AND ASSUMPTIONS

A weighted average transport distance was calculated for each group to accurately represent the environmental impacts associated with material transport. The weighting was based on the volume of materials supplied by each supplier, which ensured that larger suppliers had a proportionally greater impact on the overall impact of transport.

Most products are not individually packaged. The resulting values are derived from the calculation of average volumes, which are determined taking into account all relevant variables such as weight, volume or specific product properties. These average values are based on annual production data.

For the deconstruction of the product (module C1) a scenario was used that reflects an average deconstruction process. The weight of the raw material was set in relation to the hourly deconstruction potential of the construction machine. The value of the environmental impact was taken from a Nationale Milieudatabase (NMD) dataset stored in R<THiNK. The NMD is the Netherlands' national environmental database, providing standardized data for assessing the environmental impact of building materials. The assumptions regarding the deconstruction potential of the construction machine were taken from a study, carried out by the NMD, listed in the references. The scenario was determined using LCA Rapportage categorie 3 data Nationale Milieudatabase - Hoofdstuk 25 Leidingwerken. In Table 12 provided data for PE pipes per meter (C1). It was assumed that the nominal diameter was used.

Based on EN 15804+A2, the end-of-life system boundary of the product system is set, where outputs of the system under study, have reached the end-of-waste state. Thus, waste processing of the materials flows during any module of the product system (e.g. the production stage, end-of-life stage) are included up to the system boundary of the respective module. A product reaches its end-of-waste state when there is a market for the recovered product and when the recovered product fulfils the technical requirements for the specific purposes and meets the legislation and standards applicable to the product. Therefore producers of waste bear the burden of the waste treatment, based on the "polluter pays" principle. Consumers of recycled products receive them burden-free.

3.9 DATA QUALITY

The quality level of geographical representativeness can be considered "good".
The quality level of technical representativeness can be considered "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 were collected during data collection.

In all possible cases, primary data from customers was used, which has very good data quality because it comes directly from the source. In addition, secondary data from the ecoinvent database (2019, version 3.9.1) was used when no primary data could be supplied. The database is checked regularly and, therefore, meets 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 quantities of raw materials, consumables and supplies used and the energy consumption were recorded and averaged over the entire operating year.

3 Calculation rules

The general rule that specific data from certain production processes or average data derived from certain processes must take precedence 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, care was taken to always choose the data set/scenario that most realistically represents the processes.

3.10 POWER MIX

The electricity profile was modeled using the market-based method, aligned with the electricity mix the company buys. The overall GWP of the electricity mix used is 0.7873 kg CO2 equivalent per kWh.

4 Scenarios and additional technical information

4.1 TRANSPORT TO CONSTRUCTION SITE (A4)

For the transport from production place to assembly/user, the following scenario is assumed for module A4 of this EPD.

	Value and unit
Vehicle type used for transport	(ei3.9.1) Lorry (Truck), unspecified (default) | market group for (GLO)
Fuel type and consumption of vehicle	not available
Distance	230 km
Capacity utilisation (including empty returns)	50 % (loaded up and return empty)
Bulk density of transported products	inapplicable
Volume capacity utilisation factor	1

4.2 ASSEMBLY (A5)

The following information describes the scenarios for flows entering the system and flows leaving the system at module A5.

FLOWS ENTERING THE SYSTEM

For flows entering the system at A5 the following scenario is assumed for module A5.

	Value	Unit
Energy consumption for installation/assembly		
(ei3.9.1) Hydraulic excavator (average) [NMD generic]	0.00273	hr

FLOWS LEAVING THE SYSTEM

The following output flows leaving the system at module A5 are assumed.

Description	Value	Unit
Output materials as result of loss during construction	3	%
Output materials as result of waste processing of materials used for installation/assembly at the building site	0.000	kg
Output materials as result of waste processing of used packaging	0.327	kg

4.3 DE-CONSTRUCTION, DEMOLITION (C1)

The following information describes the scenario for demolition at end of life.

4 Scenarios and additional technical information

Description	Amount	Unit
(ei3.9.1) Hydraulic excavator (average) [NMD generic]	0.003	hr

4.4 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]
(ei3.9.1) polyolefines (i.a. pe,pp) (i.a. pipes, foils) (NMD ID 57)	(ei3.9.1) Lorry (Truck), unspecified (default) | market group for (GLO)	0	100	150	50	50

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	(ei3.9.1) 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

4.5 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.

Waste Scenario	Region	Not removed (stays in work) [%]	Landfill [%]	Incineration [%]	Recycling [%]	Re-use [%]
(ei3.9.1) polyolefines (i.a. pe,pp) (i.a. pipes, foils) (NMD ID 57)	NL	0	10	85	5	0

4 Scenarios and additional technical information

Waste Scenario	Not removed (stays in work) [kg]	Landfill [kg]	Incineration [kg]	Recycling [kg]	Re-use [kg]
(ei3.9.1) polyolefines (i.a. pe,pp) (i.a. pipes, foils) (NMD ID 57)	0.000	0.495	4.207	0.247	0.000
Total	**0.000**	**0.495**	**4.207**	**0.247**	**0.000**

4.6 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]
(ei3.9.1) polyolefines (i.a. pe,pp) (i.a. pipes, foils) (NMD ID 57)	-1.230	178.287
Total	**-1.230**	**178.287**

5 Results

For the impact assessment long-term emissions (>100 years) are not considered. 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 METER

CORE ENVIRONMENTAL IMPACT INDICATORS EN 15804+A2

Abbr.	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-total	kg CO_2 eq.	6.62E+0	1.90E-1	1.64E+0	8.44E+0	1.81E-1	1.34E+0	1.55E-1	1.03E-1	1.13E+1	6.31E-2	-6.25E+0
GWP-f	kg CO_2 eq.	6.60E+0	1.89E-1	2.72E+0	9.52E+0	1.80E-1	8.04E-1	1.55E-1	1.03E-1	1.13E+1	6.31E-2	-6.25E+0
GWP-b	kg CO_2 eq.	1.01E-2	7.64E-5	-1.09E+0	-1.08E+0	5.87E-5	5.32E-1	2.15E-5	3.35E-5	7.93E-3	3.49E-5	2.49E-3
GWP-luluc	kg CO_2 eq.	2.02E-3	6.94E-5	8.93E-4	2.98E-3	6.42E-4	2.00E-4	1.74E-5	3.67E-4	1.20E-3	4.49E-6	-1.89E-4
ODP	kg CFC 11 eq.	8.88E-2	4.18E-8	2.93E+0	3.02E+0	3.21E-9	9.05E-2	2.47E-9	1.83E-9	3.07E-7	1.37E-10	-3.73E-7
AP	mol H+ eq.	2.37E-2	1.10E-3	6.95E-3	3.17E-2	8.63E-4	2.71E-3	1.44E-3	4.92E-4	5.07E-3	4.25E-5	4.48E-4
EP-fw	kg P eq.	1.35E-4	1.91E-6	1.25E-3	1.39E-3	1.79E-6	4.35E-5	5.60E-7	1.02E-6	3.67E-5	8.96E-8	1.29E-5
EP-m	kg N eq.	4.12E-3	3.87E-4	2.62E-4	4.77E-3	3.28E-4	9.23E-4	6.65E-4	1.87E-4	1.40E-3	2.80E-5	-1.08E-3
EP-T	mol N eq.	4.53E-2	4.27E-3	3.06E-3	5.26E-2	3.50E-3	1.01E-2	7.24E-3	2.00E-3	1.56E-2	1.67E-4	-1.25E-2
POCP	kg NMVOC eq.	2.34E-2	1.22E-3	1.29E-3	2.59E-2	1.19E-3	3.29E-3	2.14E-3	6.82E-4	4.51E-3	7.23E-5	-6.59E-3
ADP-mm	kg Sb-eq.	1.88E+0	4.80E-6	3.32E+1	3.51E+1	5.64E-7	1.05E+0	5.41E-8	3.22E-7	5.90E-6	1.24E-8	1.49E-5
ADP-f	MJ	2.43E+2	2.86E+0	5.56E+0	2.51E+2	2.58E+0	1.02E+1	2.03E+0	1.47E+0	9.52E+0	1.27E-1	-6.32E+1
WDP	m3 world eq.	5.48E+0	1.02E-2	2.40E-1	5.73E+0	1.41E-2	1.94E-1	4.37E-3	8.05E-3	5.30E-1	5.34E-3	7.57E-1

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 EN 15804+A2

Abbr.	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
PM	disease incidence	1.64E-1	1.70E-8	6.00E-1	7.64E-1	1.78E-8	2.29E-2	4.00E-8	1.02E-8	4.63E-8	8.97E-10	1.54E-8
IR	kBq U235 eq.	1.43E-1	1.20E-2	7.54E-3	1.62E-1	1.01E-3	6.53E-3	4.15E-4	5.75E-4	3.62E-2	7.01E-5	2.95E-2
ETP-fw	CTUe	8.38E+0	2.55E+0	7.72E+0	1.86E+1	1.90E+0	5.63E+0	9.70E-1	1.09E+0	1.30E+2	9.50E-2	7.52E+0
HTP-c	CTUh	4.24E-4	8.27E-11	1.43E-2	1.47E-2	9.54E-11	4.42E-4	4.75E-11	5.45E-11	2.12E-9	3.49E-12	-5.23E-10
HTP-nc	CTUh	3.42E-8	2.79E-9	2.81E-9	3.98E-8	2.07E-9	2.55E-9	3.30E-10	1.18E-9	2.25E-8	1.37E-10	1.13E-9
SQP	Pt	5.98E+0	2.48E+0	4.73E+1	5.58E+1	2.04E+0	2.12E+0	1.37E-1	1.16E+0	3.19E+0	2.87E-1	-1.06E+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 index (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

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ILCD classification	Indicator	Disclaimer
	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	A4	A5	C1	C2	C3	C4	D
PERE	MJ	4.24E+0	3.58E-2	4.44E+0	8.71E+0	3.65E-2	3.12E-1	1.15E-2	2.08E-2	1.15E+0	2.35E-3	-2.12E+0
PERM	MJ	0.00E+0	0.00E+0	4.57E+0	4.57E+0	0.00E+0	1.37E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
PERT	MJ	4.24E+0	3.58E-2	9.01E+0	1.33E+1	3.65E-2	4.50E-1	1.15E-2	2.08E-2	1.15E+0	2.35E-3	-2.12E+0
PENRE	MJ	3.50E+1	3.03E+0	3.41E+1	7.22E+1	2.58E+0	4.80E+0	2.03E+0	1.48E+0	9.52E+0	1.27E-1	-9.40E+1
PENRM	MJ	2.10E+2	0.00E+0	4.75E+0	2.14E+2	0.00E+0	6.41E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	3.61E+1
PENRT	MJ	2.45E+2	3.03E+0	3.89E+1	2.87E+2	2.58E+0	1.12E+1	2.03E+0	1.48E+0	9.52E+0	1.27E-1	-5.79E+1
SM	Kg	1.48E+0	0.00E+0	2.84E-2	1.51E+0	0.00E+0	4.52E-2	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	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	0.00E+0	0.00E+0
FW	m^3	7.38E-2	3.48E-4	1.91E-2	9.33E-2	6.24E-4	3.64E-3	1.59E-4	3.56E-4	1.62E-2	1.30E-4	1.16E-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

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OTHER ENVIRONMENTAL INFORMATION DESCRIBING WASTE CATEGORIES

Abbr.	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
HWD	Kg	7.56E-5	7.24E-6	1.42E-3	1.51E-3	1.65E-5	6.17E-5	1.37E-5	9.39E-6	3.21E-5	6.28E-7	-5.23E-4
NHWD	Kg	2.17E-1	1.81E-1	2.03E-1	6.02E-1	1.71E-1	5.05E-1	2.90E-3	9.74E-2	4.43E+0	4.96E-1	-9.12E-2
RWD	Kg	1.13E-4	1.88E-5	1.06E-4	2.38E-4	5.91E-7	8.29E-6	2.22E-7	3.37E-7	2.63E-5	4.28E-8	2.92E-5

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	A4	A5	C1	C2	C3	C4	D
CRU	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	0.00E+0	0.00E+0
MFR	Kg	0.00E+0	0.00E+0	4.75E-3	4.75E-3	0.00E+0	2.44E-2	0.00E+0	0.00E+0	2.47E-1	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	0.00E+0	0.00E+0
EET	MJ	0.00E+0	0.00E+0	1.08E+0	1.08E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	5.82E+1
EEE	MJ	0.00E+0	0.00E+0	6.25E-1	6.25E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	3.38E+1

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 METER

BIOGENIC CARBON CONTENT

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

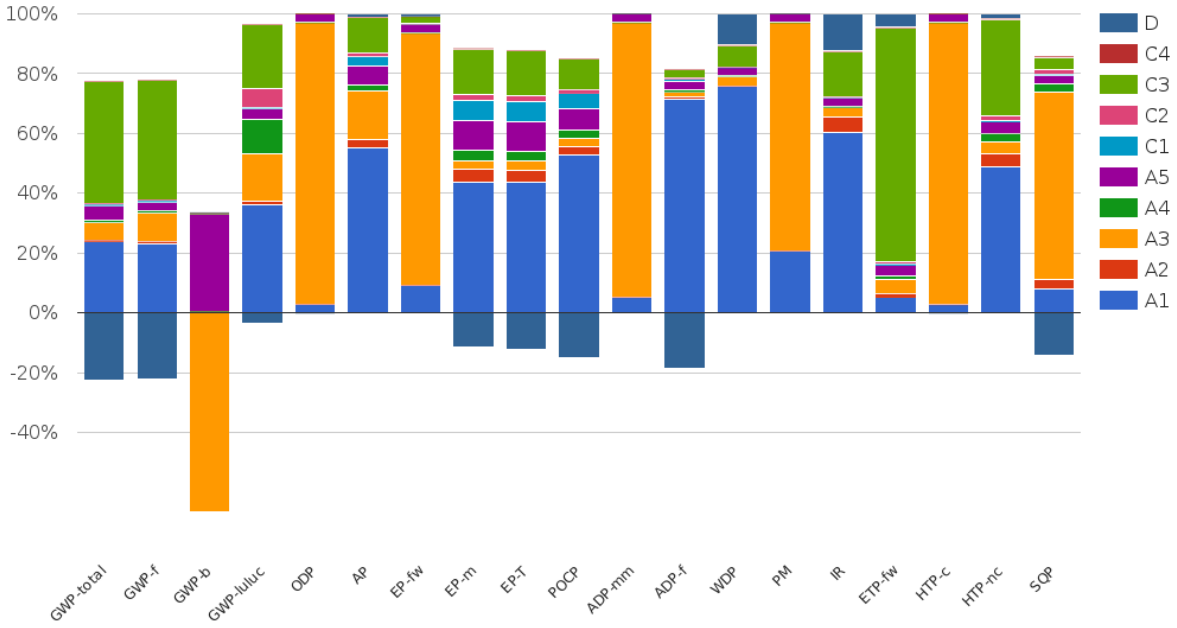
Biogenic carbon content	Amount	Unit
Biogenic carbon content in the product	0	kg C
Biogenic carbon content in accompanying packaging	0.1486	kg C

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
Packaging	0.545	kg CO2 (biogenic)

6 Interpretation of results



A1 is responsible for a major of environmental impact in many categories. Especially the impact category resource usage - fossil (ADP-f) with around 75%, WDP (Water depletion potential) with around 78 % and Potential Human exposure efficiency relative to U235 (IR) and Formation potential of tropospheric ozone (POCP) with 50% are impacted by A1.

Many categories are heavily impacted by A3, which mainly stems from the electricity usage. For GWP-b the negative A3 value stems from the wooden pallets.

The impact category ETP-freshwater (Potential Comparative Toxic Unit for ecosystems) is impacted with around 80% by the module C3.

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 15804:2012+A2:2019/AC:2021, Sustainability of Buildings - Environmental Product Declarations - Framework Development Rules by Product Category

Kiwa-EE GPI R.3.0 (2025)
Kiwa-Ecobility Experts, General Programme Instructions “Product Level”, SOP EE 1201_R.3.0 (03.06.2025)

Kiwa-EE GPI R.3.0 Annex B1 (2025)
Kiwa-Ecobility Experts, General Programme Instructions “Product Level” – Annex B1 Environmental Information Programme according to EN 15804 / ISO 21930 , SOP EE 1203_R.3.0 (03.06.2025)

Specific PCR
DIN EN 16903 - Product Category Rules complementary to EN 15804, for buried plastics piping systems prEN 16903:2021 (2022.10.22)

ecoinvent
ecoinvent Version 3.9.1 (December 2022)

R<THINK characterization method
ecoinvent 3.9.1: EN 15804+A2 indicators (EF 3.1)

NMD Hoofdstuk 25 Leidingwerken
Nationale Milieudatabase (NMD) LCA Rapportage categorie 3 data NMD Hoofdstuk 25 Leidingwerken C1 Scenario

8 Contact information

Publisher	Operator	Owner of declaration

Kiwa-Ecobility Experts
Wattstraße 11-13
13355 Berlin, DE

E-mail:
DE.Ecobility.Experts@kiwa.com
Website:
https://www.kiwa.com/de/en/themes/ecobility-experts/ecobility-experts-epd-program/

Kiwa-Ecobility Experts
Wattstraße 11-13
13355 Berlin, DE

E-mail:
DE.Ecobility.Experts@kiwa.com
Website:
https://www.kiwa.com/de/en/themes/ecobility-experts/ecobility-experts-epd-program/

HEGLER PLASTIK GmbH
Heglerstraße 8
97714 Oerlenbach, Germany, DE

E-mail:
info@hegler.de
Website:
www.hegler.de

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