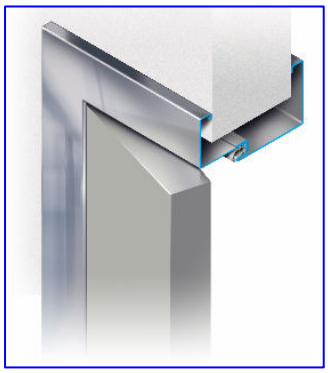
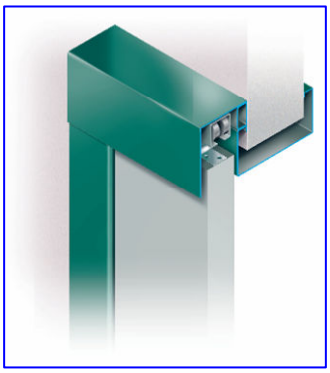
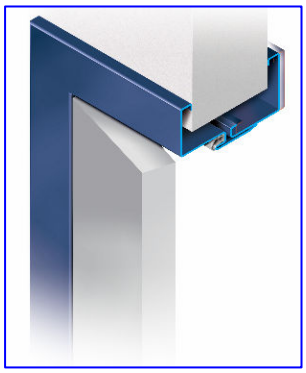
Environmental Product Declaration (EPD)

Declaration Code: EPD-RSZ-GB-45.1







rema AG / spa

Frames

Steel and stainless steel frames

Basis:

DIN EN ISO 14025
EN 15804 + A2

Company EPD
Environmental
Product **D**eclaration

Publication date:
24.06.2026

Valid until:
24.06.2031

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Testing + Calibration – EN ISO/IEC 17025
Inspection – EN ISO/IEC 17020
Product Certification – EN ISO/IEC 17065
Certification of Management Systems – EN ISO/IEC 17021

Notified Body 0757
PÜZ-Stelle BAY 18

Environmental Product Declaration (EPD)

Declaration Code: EPD-RSZ-GB-45.1

Programme operator	ift Rosenheim GmbH Theodor-Gietl-Straße 7-9 83026 Rosenheim, Germany		
Practitioner of LCA	ift Rosenheim GmbH Theodor-Gietl-Straße 7-9 83026 Rosenheim, Germany		
Declaration holder	rema AG / spa Bahnhofstraße 22a 39035 Welsberg, Germany www.rema-online.it		
Declaration code	EPD-RSZ-GB-45.1		
Designation of declared product	Steel and stainless steel frames		
Scope	Steel and stainless steel door frames, profiles, and glazing frames for high-quality interior construction.		
Basis	This EPD was prepared on the basis of EN ISO 14025:2011 and DIN EN 15804:2012+A2:2019. In addition, the Guidance on preparing Type III Environmental Product Declarations applies. The Declaration is based on the PCR documents EN 17213 “PCR for windows and doors, “PCR Part A” PCR-A-2.1:2025 and "Doors and gates” PCR-TT-3.2:2023.		
Validity	Publication date: 24.06.2026	Last revision: 07.07.2026	Valid until: 24.06.2031
	This verified company Environmental Product Declaration applies solely to the specified products and is valid for a period of five years from the date of publication according to DIN EN 15804.		
LCA basis	The LCA was prepared according to DIN EN ISO 14040 and DIN EN ISO 14044. The base data includes both the data collected at the production sites of rema AG / spa and the generic data from the database ”LCA for Experts 10“. LCA calculations were carried out for the included “cradle to gate with options” life cycle including all upstream chains (e.g. raw material extraction, etc.).		
Notes	The ift-Guidance Sheet “Conditions and Guidance for the Use of ift-Test Documents” applies. The declaration holder assumes full liability for the underlying data, certificates and verifications. Ift Rosenheim GmbH is not liable for manufacturer information, life cycle assessment data, and evidence.		
Review Committee	Dr. Torsten Mielecke Chairman of Expert Committee ift-EPD and PCR		
External Verification	Susanne Volz		

1 General product information

Product definition

The EPD relates to the product group Frames and applies to:

1 m² Steel and stainless steel frame of company rema AG / spa

The declared unit is obtained as follows:

Assessed product per product group	Declared unit	Weight per unit area	Wall thickness
Product group 1 Type 1A	1 m²	10.77 kg/m²	175 mm
Product group 2 Type 5A	1 m²	11.64 kg/m²	175 mm
Product group 3 Type 3A	1 m²	13.76 kg/m²	175 mm

Table 1 Product groups

The average unit is declared as follows:
Directly used material flows are determined using average sizes (1.23 m x 2.18 m) and allocated to the declared unit. All other inputs and outputs in the manufacture were scaled to the declared unit as a whole, since no direct assignment to the average size is possible. The reference period is the year 2025.

The validity of the EPD is restricted to the following models:

Product group	Designation
Product group 1 Frames for hinged doors	**Type 1A*** Type 2A Type 1C/2C Type 1F/2F Type 1E/2E Type 12A Type 10A/11A
Product group 2 Frames for glazing frames	**Type 5A***
Product group 3 Frames for sliding doors	**Type 3A*** Type 4A Type 3B/4B Type 13A

*in bold: worst-case product included in the balance sheet

Table 2 Validity of the EPD

Applies to models listed in Table 2 made of steel and stainless steel. The pre-check revealed that, due to varying proportions of secondary materials, steel represents the worst-case scenario. Thus, the stainless steel frames are covered by the worst-case steel products included in the balance sheet.

By multiplying the environmental impact of the glazing frame (Type 5A) accordingly, the following glazing frames with multiple glass panels can also be covered:

- Type 5B
- Type 5C
- Type 5D
- Type 5E

By adding the environmental impacts of the glazing frame (Type 5A) - as top lights or sidelights in the appropriate quantities - to the environmental impacts of the hinged door frame (Type 1A), the following frames with top lights or sidelights can also be covered:

- Type 1B / 2B
- Type 1D / 2D
- Type 6A / 7A
- Type 6B / 7B
- Type 6C / 7C
- Type 6D / 7D
- Type 6E / 7E
- Type 6F / 7F
- Type 6G / 7G
- Type 6H / 7H
- Type 8B / 9B

By adding the environmental impacts for “hinges” from ARGE (EPD-ARG-20230541-IBG1-EN) in the appropriate quantities to the environmental impacts of frames for glazing frames (Type 5A), the following frame types can also be covered:

- Type 8A / 9A
- Type 8C / 9C

Product description

Rema AG/spa manufactures steel and stainless steel frames (steel frames Corner / Solid / Speed / S2 / Teleskop / Slide / Window) for wall-mounted or retrofit installation, available in either 1.5 mm or 2.0 mm thick galvanized sheet metal or 1.5 mm or 2.0 mm thick stainless steel (V2A or V4A).
The frames are designed to accommodate at least two door hinges or, if desired, a sliding hardware. It is also possible to install the glazing for the side and top light elements on-site.
The surface of the steel frames is either powder-primed or comes powder-coated. The surface of the stainless steel frames is sanded or powder-coated.

Generally speaking, a distinction can be made between the following design variants:

- One-piece frames for wall-mounted installation
- Two-piece or multi-piece frames for retrofitting onto finished walls
- Frames with welded or multi-piece bolted corners

For a detailed product description refer to the manufacturer specifications under www.rema-online.it or the product specifications of the respective offer/quotation.

Product manufacture

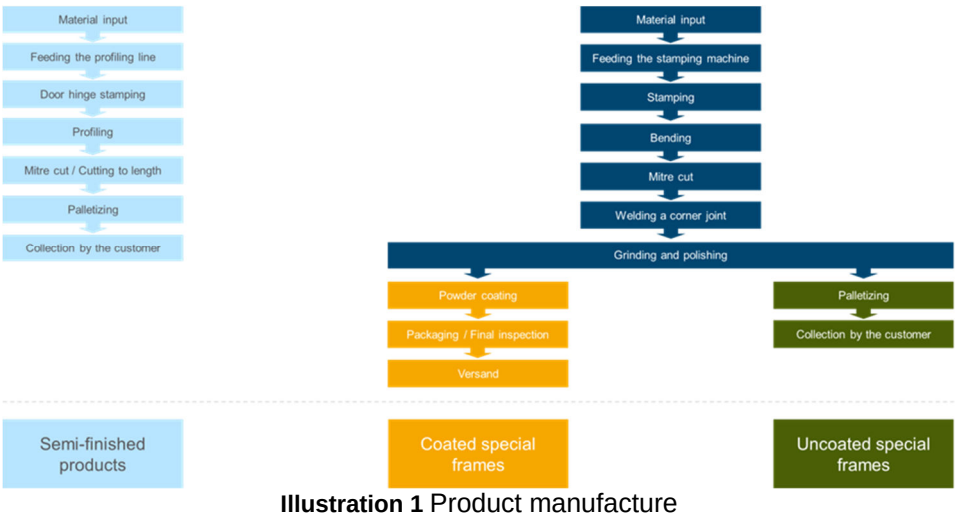


Illustration 1 Product manufacture

Application

Steel and stainless steel frames are primarily used in commercial buildings, but are also increasingly being used in the modern renovation of private residences:

- Hospitals and nursing homes
- Hotels and restaurants
- Administrative or industrial buildings
- Office and commercial buildings
- Public buildings
- Private sector, residential construction, etc.

Verifications

For further and updated verifications (incl. other national approvals) refer to www.rema-online.it.

Additional information

For additional verifications of applicability or conformity refer to the CE marking and the documents accompanying the product, if applicable.
Steel and stainless steel frames can meet the following building physics performance characteristics in accordance with the joint technical reports issued by door manufacturers and certification holder:

- Acoustic insulation
- Fire safety
- Smoke control
- Burglar resistance
- Escape and panic
- Bullet resistance

2 Materials used

Primary materials

The raw materials used can be found in Section 6.2 Inventory analysis (Inputs).

Declarable substances

The product contains no substances from the REACH candidate list (declaration dated 30.01.2026).

All relevant safety data sheets are available from rema AG / spa.

3 Construction process stage

Processing recommendations, installation

Installation is arranged by the client. Installation instructions are available in the download section of the website www.rema-online.it.
Functional doors must be installed in accordance with the installation instructions provided by the certification holder or the door manufacturer. Observe the instructions for installation, operation, maintenance and disassembly, provided by the manufacturer.

4 Use stage

Emissions to the environment

No emissions to indoor air, water and soil are known. There may be VOC emissions.

Reference service life (RSL)

The RSL information was provided by the manufacturer. The RSL must be established under specified reference conditions of use and relate to the declared technical and functional performance of the product within the building. It must be determined according to all specific rules given in European product standards or, if none are available, according to a c-PCR. It must also take into account ISO 15686-1, -2, -7 and -8. If there is guidance on deriving RSLs from European Product Standards or a c-PCR, then such guidance must take precedence.
If it is not possible to determine the service life as the RSL in accordance with ISO 15686, the BBSR table “Nutzungsdauer von Bauteilen zur Lebenszyklusanalyse nach BNB” (service life of building components for life cycle assessment in accordance with the sustainable construction evaluation system) can be used. For further information and explanations refer to www.nachhaltigesbauen.de.

For this EPD the following applies:
For an EPD "cradle to gate with options", with modules C1-C4 and module D (A1-A3 + C + D and one or more additional modules from A4 to B7), the specification of a reference service life (RSL) is only possible if the reference service life conditions are specified.
The service life of the steel and stainless steel frames manufactured by rema AG/spa is optionally specified as 50 years according to the BBSR table.

The service life is dependent on the characteristics of the product and the in-use conditions. The in-use conditions described in the EPD are applicable, in particular those listed below:

- Outdoor environment: Since the steel and stainless steel frames are intended exclusively for indoor use, there are no known weather conditions that would negatively affect their service life.
- Indoor environment: Certain factors (e.g., moisture, chemicals) may have a negative impact on the service life.

The service life applies solely to the characteristics specified in this EPD or the corresponding references.
The RSL does not reflect the actual life time, which is usually determined by the service life and the redevelopment of a building. It does not give any information on the useful life, warranty referring to performance characteristics or guarantees.

5 End-of-life stage

Possible end-of-life stages

The Steel and stainless steel frames are shipped to central collection points. There the products are generally shredded and sorted into their original constituents. The end-of-life stage depends on the site where the products are used and is therefore subject to the local regulations. Observe the locally applicable regulatory requirements.

This EPD shows the end-of-life modules according to the market situation.
Metals are 100% recycled and plastics are 100% thermally recycled. Residual fractions are sent to landfill.

Disposal routes

The average disposal routes were taken into account in the LCA.

All life cycle scenarios are detailed in the Annex.

6 Life Cycle Assessment (LCA)

Environmental product declarations are based on life cycle assessments (LCAs) which use material and energy flows for the calculation and subsequent representation of environmental impacts.

As a basis for this, life cycle assessments were prepared for Steel and stainless steel frames. They fulfil the requirements set out by DIN EN 15804 and the international standards DIN EN ISO 14040, DIN EN ISO 14044 and EN ISO 14025 and are based on ISO 21930.

The LCA is representative of the products presented in the Declaration and the specified reference period.

6.1 Definition of goal and scope

Goal

The goal of the LCA is to demonstrate the environmental impacts of the products. In accordance with DIN EN 15804, the environmental impacts covered by this Environmental Product Declaration are presented for the entire product life cycle in the form of basic information. Apart from these, no other environmental impacts have been specified.

Data quality, data availability and geographical and time-related system boundaries

The specific data originates exclusively from the financial year 2025. They were collected on-site at the plant located in 39035 Welsberg, Italy, and come in parts from company records and partly from values directly obtained by measurement. Primary data was collected for energy, water and packaging costs as well as for auxiliary materials and waste/offcuts. At the time of the plausibility check on 09.04.2026, data for energy, water, packaging costs, auxiliary materials and waste/scrap was available in full and was checked for validity.

The generic data come from the “LCA for Experts 10” professional and building materials databases. The last update of both databases was in 2026. Data from before this date come also from these databases and are not more than three years old. No other generic data were used for the calculation.

Generic data are selected as accurately as possible in terms of geographic reference. If no country-specific data sets are available or if the regional reference cannot be determined, European or globally valid data sets are used.

Data gaps were either filled with comparable data or conservative assumptions, or the data were cut off in compliance with the 1% rule.

The life cycle was modelled using the sustainability software tool “LCA for Experts” in version 10.9.5.2 with database version 2026.1 for the development of life cycle assessments. The LCA was evaluated using the impact assessment method EF3.1.

The data quality complies with the requirements of EN15941:2024-10.

Scope / system boundaries

The system boundaries refer to the supply of raw materials and purchased parts, manufacture, use and end-of-life stage of Steel and stainless steel frames.
Additional specific data regarding the manufacture of the products was obtained from the Working Group of European Lock and Hardware Industry Associations (ARGE) (declaration code: EPD-ARG-20230541-IBG1-EN). The weight per door hinge accounted for 50% of the total, since only the hinge pockets are attached to the frame. No additional data from pre-suppliers or other sites were taken into consideration.

Cut-off criteria

All company data collected, i.e. all commodities/input and raw materials used, the thermal energy and electricity consumption, were taken into consideration.

The boundaries cover only the product-relevant data. Building sections/parts of facilities that are not relevant to the manufacture of the products, were excluded.

Distances are available for 100% of the pre-products (mass-related), which is why the transport routes can be calculated.
A truck semitrailer (Euro 0-6 mix, 34-40 t total weight, 27 t payload, 61% capacity utilization (according to standard data set)) is used for the auxiliary materials, pre-products and packaging.

In addition to the transport distances for pre-products, the transport distances for waste were also taken into consideration. The transport of waste in A3 was presented by the following standard scenario:

- Transport to collection point using 34-40 t truck (Euro 0-6 mix), diesel, 27 t payload, 50% capacity used, 100 km. (1)

The criteria for the exclusion of inputs and outputs as set out in DIN EN 15804 are fulfilled. From the data analysis it can be assumed that the total of negligible processes per life cycle stage does not exceed 1% of the mass/primary energy. All in all, the total of negligible processes does not exceed 5% of the energy and mass input.

6.2 Inventory analysis

Aim

All material and energy flows are described below. The processes covered are presented as input and output parameters and refer to the declared units.

Life cycle stages

The Annex shows the entire life cycle of Steel and stainless steel frames. The product stage "A1 – A3", construction process stage "A4 – A5", use stage "B2 – B7", end-of-life stage "C1 – C4" and the benefits and loads beyond the system boundaries "D" are considered.

Benefits

The below benefits have been defined as per DIN EN 15804:

- Benefits from recycling
- Benefits (thermal and electrical) from incineration

Allocation of co-products

No allocations occur during production.

Allocations for reuse, recycling and recovery

If the products are re-used/recycled and recovered during the product stage (rejects), the components are shredded/broken, if necessary and then sorted into their single constituents. This is done by various process plants, e.g. magnetic separators.
The system boundaries were set following their disposal, reaching the end-of-waste status.

Allocations beyond life cycle boundaries

The use of secondary materials in the manufacturing process was based on the current market-specific situation. In parallel to this, a recycling potential was taken into consideration that reflects the economic value of the product after recycling (recyclate).
For secondary materials used as inputs in the production process, Module A1 accounts for electricity, oxygen, and gas as costs associated with their processing. No benefits are allocated to module D, but consumption is allocated to modules C3 & C4 (worst case scenario).
The system boundary set for the secondary material refers to collection.

Secondary material

Secondary materials are used. The use of secondary material in module A3 was considered by rema AG / spa based on manufacturers' declarations (from 2025, with 2024 as the reference year) provided by upstream suppliers.

The materials with secondary material and the corresponding proportion are shown in Table 3.

Material	Secondary material share* in % per material
	Product
Steel	18.0

* The secondary material share corresponds to the recyclate content according to EN ISO 14021
Note: The closed-loop portion (waste before use from the same process) is by definition not included in this figure.

Table 3 Secondary material share

Inputs

The following manufacturing-related inputs were included in the LCA per 1 m² Steel and stainless steel **frame**:

Energy
For the input material natural gas, "Thermal Energy from Natural Gas (IT)" is used; for the input material district heating from biomass, "District Heating from Biomass (DE)" is used; and for electricity purchased from the grid, "Electricity from Hydropower (IT)" (market-based approach) is used.

Electricity disclosure of energy supplier	Shares in %
Hydropower	100.0

Table 4 Green electricity mix

Type of energy	Total	Unit
Electricity from hydropower	1.02E-02	kg CO2-eq. / kWh
District Heating from biomass	1.74E-02	kg CO2-eq. / kWh
Thermal energy from natural gas	2.64E-01	kg CO2-eq. / kWh

Table 5 Greenhouse gas emissions from the use of electricity/biomass/gas in the manufacturing phase

A portion of the process heat is used for space heating. This can, however, not be quantified and a “worst case” figure was taken into account for the product.

Water
The water consumed by the individual process steps for the manufacture amounts to a total of 3.6 l per m² of the element.
The consumption of freshwater specified in Section 6.3 originates (among others) from the process chain of the pre-products, the washing system of the powder coating facility, and the process water used for cooling.

Raw material/pre-products
The charts below show the share of raw materials/pre-products in percent.

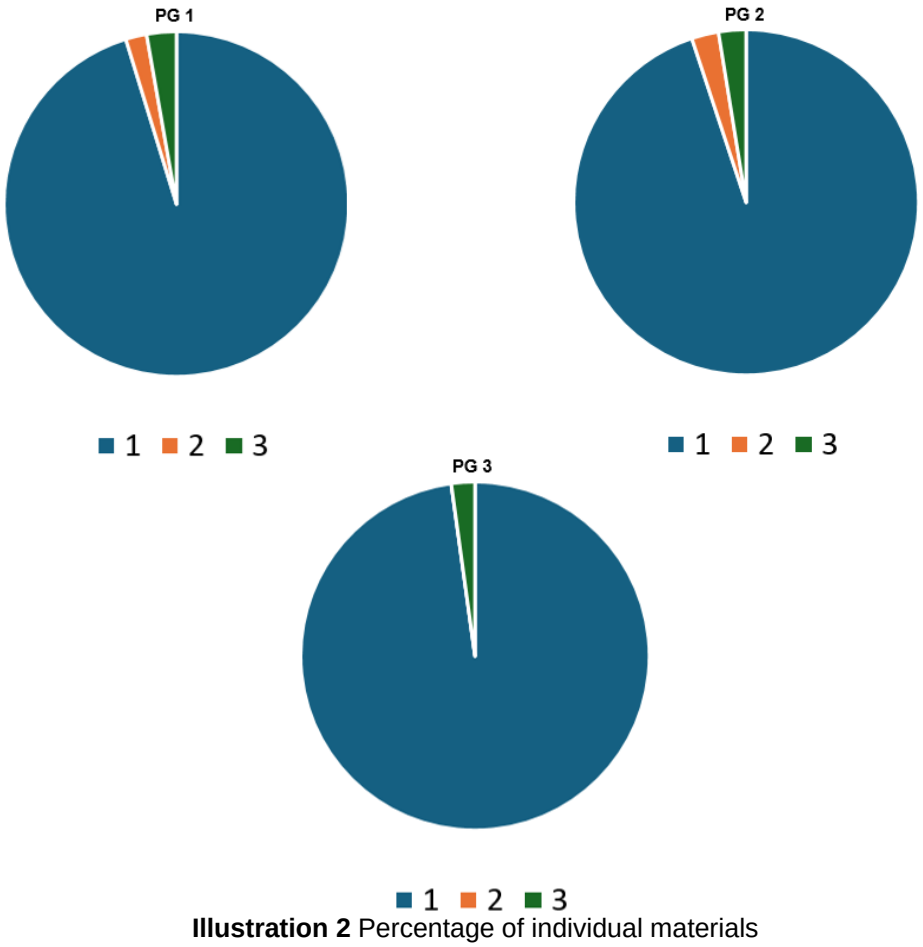


Illustration 2 Percentage of individual materials

No.	Material	Mass in %		
		PG 1	PG 2	PG 3
1	Metals	95.24	94.90	97.82
2	Plastics	1.97	2.53	<1
3	Powder coatings	2.78	2.57	2.18

Table 4 Percentage of individual materials

Ancillary materials and consumables
0.13 kg/m² of ancillary materials and consumables are used.

Product packaging
The amounts used for product packaging are as follows:

No.	Material	Mass in kg/m²		
		PG 1	PG 2	PG 3
1	Foil and protective covers	7.64E-02	7.64E-02	7.64E-02
2	Wood	0.91	0.46	1.21
3	Cardboard	0.13	0.13	0.16

Table 6 Weight in kg of packaging per declared unit

Biogenic carbon content
Only the biogenic carbon content of the associated packaging is reported, as the total mass of biogenic carbon-containing materials is less than 5% of the total mass of the product and associated packaging. According to EN 16449, the following amounts of biogenic carbon are generated for packaging:

No.	Component	Content in kg C per m²		
		PG1	PG2	PG3
1	Associated packaging	0.38	0.21	0.50

Note: 1 kg C corresponds to 44/12 kg CO_2-eqv. of biogenic carbon

Table 7 Biogenic carbon content of packaging at gate

GWP-b values resulting from the sequestration and release of biogenic carbon were calculated specifically for each life cycle module and are listed in Table 8. The overall results table presented in this document, issued by "LCA for Experts", has not been changed.

Binding and release of CO_2 emissions in kg CO_2-eqv. / m²						
Component		A1-A3	A5	C3	C4	D
PG1	Packaging	-0.38	+0.38	0	0	0
PG2	Packaging	-0.21	+0.21	0	0	0
PG3	Packaging	-0.50	+0.50	0	0	0

Note: 1 kg C corresponds to 44/12 kg CO_2-eqv. of biogenic carbon

Table 8 Binding and release of biogenic CO2 emissions in kg CO2-eqv. from product and packaging per life cycle module

Outputs

The LCA includes the following production-relevant outputs per 1 m² Steel and stainless steel frame:

Waste
Secondary raw materials were included in the benefits.
See Section 6.3 - Impact assessment.

Waste water
The manufacture produces 0.11 l/m² waste water.

6.3 Impact assessment

Aim

The impact assessment covers inputs and outputs. The impact categories applied are named below:

Core indicators

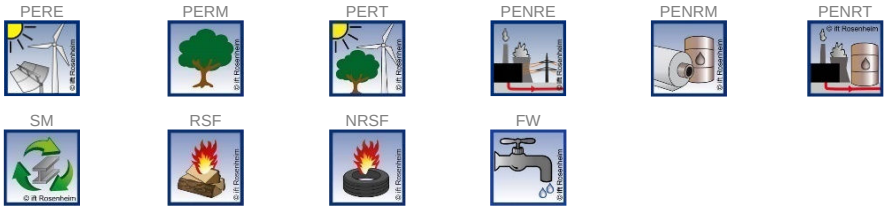
The models for impact assessment were applied as described in DIN EN 15804+A2.
The impact categories presented as core indicators in the EPD are as follows:

- Climate change - total (GWP-t)
- Climate change - fossil (GWP-f)
- Climate change - biogenic (GWP-b)
- Climate change - land use & land use change (GWP-l)
- Ozone depletion (ODP)
- Acidification (AP)
- Eutrophication freshwater (EP-fw)
- Eutrophication salt water (EP-m)
- Eutrophication land (EP-t)
- Photochemical ozone creation (POCP)
- Depletion of abiotic resources - fossil fuels (ADPF)
- Depletion of abiotic resources - minerals and metals (ADPE)
- Water use (WDP)

Use of resources

The models for impact assessment were applied as described in DIN EN 15804-A2.
The following resource use indicators are presented in the EPD:

- Renewable primary energy as energy source (PERE)
- Renewable primary energy for material use (PERM)
- Total use of renewable primary energy (PERT)
- Non-renewable primary energy as energy resource (PENRE)
- Non-renewable primary energy for material use (PENRM)
- Total use of non-renewable primary energy (PENRT)
- Use of secondary materials (SM)
- Use of renewable secondary fuels (RSF)
- Use of non-renewable secondary fuels (NRSF)
- Net use of freshwater resources (FW)

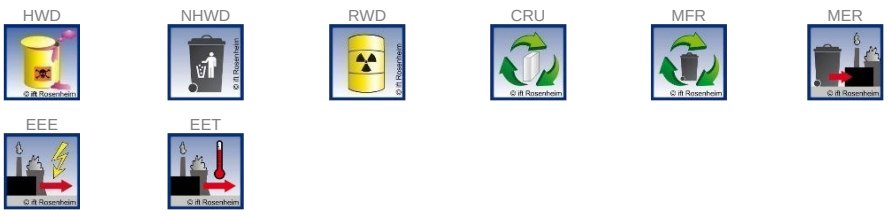


Waste

The waste generate during the production of 1 m² of Steel and stainless steel frame is evaluated and shown separately for the fractions trade wastes, special wastes and radioactive wastes. Since waste handling is modelled within the system boundaries. the amounts shown refer to the deposited wastes. A portion of the waste indicated is generated during the manufacture of the pre-products.

The models for impact assessment were applied as described in DIN EN 15804-A2.
The waste categories and indicators for output material flows presented in the EPD are as follows:

- Disposed hazardous waste (HWD)
- Non-hazardous waste disposed (NHWD)
- Radioactive waste disposed (RWD)
- Components for re-use (CRU)
- Materials for recycling (MFR)
- Materials for energy recovery (MER)
- Exported electrical energy (EEE)
- Exported thermal energy (EET)



Additional environmental impact indicators

The models for impact assessment were applied as described in DIN EN 15804-A2.
The additional impact categories presented in the EPD are as follows:

- Particulate matter emissions (PM)
- Ionizing radiation, human health (IRP)
- Ecotoxicity – freshwater (ETP-fw)
- Human toxicity, carcinogenic effects (HTP-c)
- Human toxicity, non-carcinogenic effects (HTP-nc)
- Impacts associated with land use/soil quality (SQP)

PM 

IRP 

ETP-fw 

HTP-c 

HTP-nc 

SQP 

Results per 1 m² of steel and stainless steel frames type 1A (PG1)

	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Core indicators																
GWP-t	kg CO_2 eq.	24.29	2.66	1.85	ND	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.94	8.06E-03	-16.10
GWP-f	kg CO_2 eq.	25.81	2.53	0.22	ND	0.99	0.00	0.00	0.00	0.00	0.00	0.00	9.86E-02	0.94	8.06E-03	-16.10
GWP-b	kg CO_2 eq.	-1.64	0.10	1.63	ND	4.74E-03	0.00	0.00	0.00	0.00	0.00	0.00	4.04E-03	4.87E-03	-1.21E-05	-4.55E-03
GWP-l	kg CO_2 eq.	5.12E-02	2.59E-02	3.71E-05	ND	5.47E-04	0.00	0.00	0.00	0.00	0.00	0.00	1.01E-03	1.41E-03	1.46E-05	-8.29E-03
ODP	kg CFC-11 eq.	9.58E-08	4.89E-13	4.61E-13	ND	7.05E-12	0.00	0.00	0.00	0.00	0.00	0.00	1.90E-14	2.07E-11	4.01E-14	-2.74E-11
AP	mol H^+ eq.	7.37E-02	8.27E-03	3.27E-04	ND	1.81E-03	0.00	0.00	0.00	0.00	0.00	0.00	1.45E-04	1.26E-03	5.81E-05	-3.61E-02
EP-fw	kg P eq.	1.30E-04	6.82E-06	2.69E-08	ND	1.13E-06	0.00	0.00	0.00	0.00	0.00	0.00	2.64E-07	5.05E-07	1.02E-08	-8.70E-06
EP-m	kg N eq.	1.72E-02	3.89E-03	9.91E-05	ND	5.07E-04	0.00	0.00	0.00	0.00	0.00	0.00	5.93E-05	3.18E-04	1.51E-05	-8.79E-03
EP-t	mol N-eq.	0.19	4.20E-02	1.40E-03	ND	5.59E-03	0.00	0.00	0.00	0.00	0.00	0.00	6.19E-04	3.90E-03	1.66E-04	-9.38E-02
POCP	kg NMVOC eq.	5.56E-02	7.69E-03	2.69E-04	ND	2.01E-03	0.00	0.00	0.00	0.00	0.00	0.00	1.29E-04	7.55E-04	4.52E-05	-2.96E-02
ADPF*²	MJ	276.73	32.60	0.50	ND	29.80	0.00	0.00	0.00	0.00	0.00	0.00	1.26	8.97	0.10	-134.00
ADPE*²	kg Sb eq.	4.44E-04	1.68E-07	4.08E-09	ND	1.81E-07	0.00	0.00	0.00	0.00	0.00	0.00	6.53E-09	1.19E-07	5.61E-10	-1.46E-04
WDP*²	m^3 world eq. deprived	4.34	1.26E-02	0.20	ND	0.28	0.00	0.00	0.00	0.00	0.00	0.00	4.90E-04	0.14	8.86E-04	-0.29
Resource management																
PERE	MJ	60.78	2.47	18.07	ND	2.32	0.00	0.00	0.00	0.00	0.00	0.00	9.57E-02	6.80	2.15E-02	11.30
PERM	MJ	17.93	0.00	-17.93	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PERT	MJ	78.71	2.47	0.14	ND	2.32	0.00	0.00	0.00	0.00	0.00	0.00	9.57E-02	6.80	2.15E-02	11.30
PENRE	MJ	265.40	32.60	3.81	ND	29.80	0.00	0.00	0.00	0.00	0.00	0.00	1.26	16.59	0.10	-134.00
PENRM	MJ	11.33	0.00	-3.31	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-7.62	0.00	0.00
PENRT	MJ	276.73	32.60	0.50	ND	29.80	0.00	0.00	0.00	0.00	0.00	0.00	1.26	8.97	0.10	-134.00
SM	kg	2.07	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RSF	MJ	0.00	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NRSF	MJ	0.00	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FW	m^3	0.11	1.27E-03	4.77E-03	ND	7.43E-03	0.00	0.00	0.00	0.00	0.00	0.00	4.91E-05	5.37E-03	2.53E-05	-1.75E-02
Waste categories																
HWD	kg	1.10E-04	1.38E-09	2.94E-10	ND	5.32E-09	0.00	0.00	0.00	0.00	0.00	0.00	5.34E-11	1.34E-08	2.57E-11	-3.55E-06
NHWD	kg	1.29	4.63E-03	5.20E-02	ND	1.40E-02	0.00	0.00	0.00	0.00	0.00	0.00	1.79E-04	1.76E-02	0.54	-0.43
RWD	kg	2.10E-03	6.40E-05	2.04E-05	ND	4.02E-04	0.00	0.00	0.00	0.00	0.00	0.00	2.48E-06	1.22E-03	7.24E-07	-4.93E-04
Output material flows																
CRU	kg	0.00	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MFR	kg	1.33	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00	0.00	0.00
MER	kg	0.00	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EEE	MJ	9.42E-02	0.00	2.68	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.78	0.00	0.00
EET	MJ	4.36E-02	0.00	4.82	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.78	0.00	0.00

Key:

GWP-t – global warming potential - total **GWP-f** – global warming potential fossil fuels **GWP-b** – global warming potential - biogenic **GWP-l** – global warming potential - land use and land use change **ODP** – ozone depletion potential **AP** - acidification potential **EP-fw** - eutrophication potential - aquatic freshwater **EP-m** - eutrophication potential - aquatic marine **EP-t** - feutrophication potential - terrestrial **POCP** - photochemical ozone formation potential **ADPF*²** - abiotic depletion potential – fossil resources **ADPE*²** - abiotic depletion potential – minerals&metals **WDP*²** – Water (user) deprivation potential **PERE** - Use of renewable primary energy **PERM** - use of renewable primary energy resources **PERT** - total use of renewable primary energy resources **PENRE** - use of non-renewable primary energy **PENRM** - use of non-renewable primary energy resources **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 **HWD** - hazardous waste disposed **NHWD** - non-hazardous waste disposed **RWD** - radioactive waste disposed **CRU** - components for re-use **MFR** - materials for recycling **MER** - materials for energy recovery **EEE** - exported electrical energy **EET** - exported thermal energy **ND** – not included

Results per 1 m² of steel and stainless steel frames Type 1A (PG1)															
	Unit	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Additional environmental impact indicators																
PM	Disease incidence	9.03E-07	6.90E-08	2.28E-09	ND	1.72E-08	0.00	0.00	0.00	0.00	0.00	0.00	1.31E-09	9.97E-09	7.27E-10	-5.33E-07
IRP*[1]	kBq U235-eq.	0.29	9.08E-03	2.99E-03	ND	6.02E-02	0.00	0.00	0.00	0.00	0.00	0.00	3.52E-04	0.19	7.74E-05	-9.14E-02
ETP-fw*[2]	CTUe	217.48	42.10	0.23	ND	17.20	0.00	0.00	0.00	0.00	0.00	0.00	1.63	2.12	6.39E-02	-22.10
HTP-c*[2]	CTUh	3.45E-08	5.69E-10	1.91E-11	ND	3.22E-10	0.00	0.00	0.00	0.00	0.00	0.00	2.20E-11	1.45E-10	1.36E-12	-2.41E-08
HTP-nc*[2]	CTUh	4.08E-07	3.18E-08	1.05E-09	ND	6.19E-09	0.00	0.00	0.00	0.00	0.00	0.00	1.23E-09	4.60E-09	5.32E-11	1.29E-08
SQP*[2]	dimensionless	186.80	14.30	0.14	ND	1.84	0.00	0.00	0.00	0.00	0.00	0.00	0.55	3.71	3.33E-02	-1.23

Key:
PM – particulate matter emissions potential **IRP*[1]** – ionizing radiation potential – human health **ETP-fw*[2]** - Eco-toxicity potential – freshwater **HTP-c*[2]** - Human toxicity potential – cancer effects **HTP-nc*[2]** - Human toxicity potential – non-cancer effects **SQP*[2]** – soil quality potential **ND** – not included

Disclaimers

*1 This impact category deals mainly with the eventual impact of low-dose ionising 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 ionising radiation from the soil. from radon and from some building materials is also not measured by this indicator

*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 experience with the indicator

	Results per 1 m² of steel and stainless steel frames Type 5A (PG2)															
	Unit	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Core indicators																
GWP-t	kg CO_2 eq.	36.19	2.76	1.11	ND	1.16	0.00	0.00	0.00	0.00	0.00	0.00	0.11	1.16	8.72E-03	-23.30
GWP-f	kg CO_2 eq.	36.81	2.62	0.21	ND	1.16	0.00	0.00	0.00	0.00	0.00	0.00	0.11	1.15	8.71E-03	-23.20
GWP-b	kg CO_2 eq.	-0.78	0.11	0.90	ND	5.73E-03	0.00	0.00	0.00	0.00	0.00	0.00	4.36E-03	5.27E-03	-1.31E-05	-3.68E-02
GWP-l	kg CO_2 eq.	9.87E-02	2.68E-02	2.41E-05	ND	7.16E-04	0.00	0.00	0.00	0.00	0.00	0.00	1.09E-03	1.53E-03	1.58E-05	-2.57E-02
ODP	kg CFC-11 eq.	5.73E-10	5.06E-13	2.93E-13	ND	9.35E-12	0.00	0.00	0.00	0.00	0.00	0.00	2.05E-14	2.24E-11	4.33E-14	-1.71E-10
AP	mol H^+ eq.	0.12	8.55E-03	2.02E-04	ND	1.98E-03	0.00	0.00	0.00	0.00	0.00	0.00	1.57E-04	1.41E-03	6.28E-05	-6.47E-02
EP-fw	kg P eq.	2.95E-05	7.05E-06	1.72E-08	ND	1.10E-06	0.00	0.00	0.00	0.00	0.00	0.00	2.86E-07	5.49E-07	1.11E-08	-1.11E-05
EP-m	kg N eq.	2.99E-02	4.02E-03	6.24E-05	ND	5.99E-04	0.00	0.00	0.00	0.00	0.00	0.00	6.40E-05	3.57E-04	1.64E-05	-1.54E-02
EP-t	mol N eq.	0.33	4.34E-02	8.75E-04	ND	6.60E-03	0.00	0.00	0.00	0.00	0.00	0.00	6.69E-04	4.42E-03	1.79E-04	-0.17
POCP	kg NMVOC eq.	9.13E-02	7.96E-03	1.69E-04	ND	2.24E-03	0.00	0.00	0.00	0.00	0.00	0.00	1.40E-04	8.50E-04	4.89E-05	-4.79E-02
ADPF*²	MJ	422.74	33.70	0.32	ND	31.70	0.00	0.00	0.00	0.00	0.00	0.00	1.37	9.73	0.11	-220.00
ADPE*²	kg Sb eq.	5.39E-06	1.74E-07	2.56E-09	ND	2.22E-07	0.00	0.00	0.00	0.00	0.00	0.00	7.06E-09	1.28E-07	6.07E-10	-1.94E-06
WDP*²	m^3 world eq. deprived	6.67	1.31E-02	0.12	ND	0.32	0.00	0.00	0.00	0.00	0.00	0.00	5.29E-04	0.17	9.57E-04	-0.90
Use of resources																
PERE	MJ	120.78	2.55	10.02	ND	3.08	0.00	0.00	0.00	0.00	0.00	0.00	0.10	7.36	2.32E-02	-47.80
PERM	MJ	9.93	0.00	-9.93	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PERT	MJ	130.71	2.55	9.08E-02	ND	3.08	0.00	0.00	0.00	0.00	0.00	0.00	0.10	7.36	2.32E-02	-47.80
PENRE	MJ	408.31	33.70	3.63	ND	31.70	0.00	0.00	0.00	0.00	0.00	0.00	1.37	20.30	0.11	-220.00
PENRM	MJ	14.43	0.00	-3.31	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-10.57	0.00	0.00
PENRT	MJ	422.74	33.70	0.32	ND	31.70	0.00	0.00	0.00	0.00	0.00	0.00	1.37	9.73	0.11	-220.00
SM	kg	2.04	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RSF	MJ	0.00	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NRSF	MJ	0.00	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FW	m^3	0.21	1.31E-03	2.87E-03	ND	8.66E-03	0.00	0.00	0.00	0.00	0.00	0.00	5.31E-05	6.15E-03	2.73E-05	-4.79E-02
Waste categories																
HWD	kg	1.25E-07	1.43E-09	1.86E-10	ND	6.80E-09	0.00	0.00	0.00	0.00	0.00	0.00	5.77E-11	1.45E-08	2.78E-11	-4.81E-08
NHWD	kg	4.62	4.79E-03	3.75E-02	ND	1.80E-02	0.00	0.00	0.00	0.00	0.00	0.00	1.94E-04	2.20E-02	0.58	-2.73
RWD	kg	6.89E-03	6.62E-05	1.24E-05	ND	5.33E-04	0.00	0.00	0.00	0.00	0.00	0.00	2.68E-06	1.32E-03	7.82E-07	-4.13E-03
Output material flows																
CRU	kg	0.00	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MFR	kg	1.39	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.80	0.00	0.00
MER	kg	0.00	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EEE	MJ	9.42E-02	0.00	1.65	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.08	0.00	0.00
EET	MJ	4.36E-02	0.00	2.97	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.47	0.00	0.00

Key:
GWP-t – global warming potential - total **GWP-f** – global warming potential fossil fuels **GWP-b** – global warming potential - biogenic **GWP-l** – global warming potential - land use and land use change **ODP** – ozone depletion potential **AP** - acidification potential **EP-fw** - eutrophication potential - aquatic freshwater **EP-m** - eutrophication potential - aquatic marine **EP-t** - feutrophication potential - terrestrial **POCP** - photochemical ozone formation potential **ADPF*²** - abiotic depletion potential – fossil resources **ADPE*²** - abiotic depletion potential – minerals&metals **WDP*²** – Water (user) deprivation potential **PERE** - Use of renewable primary energy **PERM** - use of renewable primary energy resources **PERT** - total use of renewable primary energy resources **PENRE** - use of non-renewable primary energy **PENRM** - use of non-renewable primary energy resources **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 **HWD** - hazardous waste disposed **NHWD** - non-hazardous waste disposed **RWD** - radioactive waste disposed **CRU** - components for re-use **MFR** - materials for recycling **MER** - materials for energy recovery **EEE** - exported electrical energy **EET** - exported thermal energy **ND** – not included

Results per 1 m² of steel and stainless steel frames Type 5A (PG2)																
	Unit	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Additional environmental impact indicators																
PM	Disease incidence	1.65E-06	7.14E-08	1.43E-09	ND	1.83E-08	0.00	0.00	0.00	0.00	0.00	0.00	1.42E-09	1.10E-08	7.85E-10	-9.89E-07
IRP*[1]	kBq U235-Äqv.	0.75	9.39E-03	1.80E-03	ND	8.02E-02	0.00	0.00	0.00	0.00	0.00	0.00	3.81E-04	0.20	8.36E-05	-0.43
ETP-fw*[2]	CTUe	132.51	43.50	0.16	ND	17.10	0.00	0.00	0.00	0.00	0.00	0.00	1.76	2.31	6.91E-02	-52.40
HTP-c*[2]	CTUh	3.45E-08	5.89E-10	1.16E-11	ND	3.40E-10	0.00	0.00	0.00	0.00	0.00	0.00	2.38E-11	1.58E-10	1.47E-12	-2.82E-08
HTP-nc*[2]	CTUh	1.81E-07	3.29E-08	6.51E-10	ND	6.73E-09	0.00	0.00	0.00	0.00	0.00	0.00	1.33E-09	5.04E-09	5.74E-11	-3.45E-08
SQP*[2]	dimensionless.	138.80	14.80	8.66E-02	ND	2.47	0.00	0.00	0.00	0.00	0.00	0.00	0.60	4.02	3.60E-02	-14.30

Key:
PM – particulate matter emissions potential **IRP*[1]** – ionizing radiation potential – human health **ETP-fw*[2]** - Eco-toxicity potential – freshwater **HTP-c*[2]** - Human toxicity potential – cancer effects **HTP-nc*[2]** - Human toxicity potential – non-cancer effects **SQP*[2]** – soil quality potential **ND** – not included

Disclaimers

*1 This impact category deals mainly with the eventual impact of low-dose ionising 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 ionising radiation from the soil. from radon and from some building materials is also not measured by this indicator

*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 experience with the indicator

	Results per 1 m² of steel and stainless steel frames Type 3A (PG3)															
	Unit	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Core indicators																
GWP-t	kg CO_2 eq.	27.64	3.40	2.38	ND	7.21E-02	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.61	1.03E-02	-20.60
GWP-f	kg CO_2 eq.	29.76	3.24	0.23	ND	7.17E-02	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.61	1.03E-02	-20.60
GWP-b	kg CO_2 eq.	-2.12	0.13	2.15	ND	3.25E-04	0.00	0.00	0.00	0.00	0.00	0.00	5.16E-03	6.18E-03	-1.55E-05	-3.02E-03
GWP-l	kg CO_2 eq.	5.00E-02	3.31E-02	4.67E-05	ND	1.12E-05	0.00	0.00	0.00	0.00	0.00	0.00	1.28E-03	1.79E-03	1.87E-05	-1.01E-02
ODP	kg CFC-11 eq.	5.16E-10	6.24E-13	5.85E-13	ND	1.61E-13	0.00	0.00	0.00	0.00	0.00	0.00	2.42E-14	2.63E-11	5.12E-14	-2.47E-11
AP	mol H^+ eq.	6.94E-02	1.06E-02	4.22E-04	ND	8.03E-05	0.00	0.00	0.00	0.00	0.00	0.00	1.86E-04	1.43E-03	7.42E-05	-4.48E-02
EP-fw	kg P eq.	3.11E-05	8.70E-06	3.42E-08	ND	1.29E-07	0.00	0.00	0.00	0.00	0.00	0.00	3.38E-07	6.35E-07	1.31E-08	-1.05E-05
EP-m	kg N eq.	1.86E-02	4.96E-03	1.28E-04	ND	2.47E-05	0.00	0.00	0.00	0.00	0.00	0.00	7.57E-05	3.51E-04	1.93E-05	-1.09E-02
EP-t	mol N eq.	0.20	5.36E-02	1.80E-03	ND	2.63E-04	0.00	0.00	0.00	0.00	0.00	0.00	7.90E-04	4.14E-03	2.12E-04	-0.12
POCP	kg NMVOC eq.	5.97E-02	9.82E-03	3.46E-04	ND	1.28E-04	0.00	0.00	0.00	0.00	0.00	0.00	1.65E-04	8.23E-04	5.78E-05	-3.73E-02
ADPF*²	MJ	295.39	41.60	0.63	ND	1.97	0.00	0.00	0.00	0.00	0.00	0.00	1.62	11.30	0.13	-166.00
ADPE*²	kg Sb eq.	2.52E-06	2.15E-07	5.20E-09	ND	5.33E-09	0.00	0.00	0.00	0.00	0.00	0.00	8.34E-09	1.50E-07	7.17E-10	-3.66E-07
WDP*²	m^3 world eq. deprived	4.33	1.61E-02	0.26	ND	0.16	0.00	0.00	0.00	0.00	0.00	0.00	6.26E-04	0.12	1.13E-03	-0.21
Use of resources																
PERE	MJ	62.55	3.15	23.89	ND	4.71E-02	0.00	0.00	0.00	0.00	0.00	0.00	0.12	8.64	2.74E-02	21.10
PERM	MJ	23.71	0.00	-23.71	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PERT	MJ	86.26	3.15	0.18	ND	4.71E-02	0.00	0.00	0.00	0.00	0.00	0.00	0.12	8.64	2.74E-02	21.10
PENRE	MJ	292.08	41.60	3.94	ND	1.97	0.00	0.00	0.00	0.00	0.00	0.00	1.62	11.30	0.13	-166.00
PENRM	MJ	3.31	0.00	-3.31	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PENRT	MJ	295.39	41.60	0.63	ND	1.97	0.00	0.00	0.00	0.00	0.00	0.00	1.62	11.30	0.13	-166.00
SM	kg	2.65	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RSF	MJ	0.00	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NRSF	MJ	0.00	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FW	m^3	0.11	1.62E-03	6.16E-03	ND	3.88E-03	0.00	0.00	0.00	0.00	0.00	0.00	6.27E-05	5.45E-03	3.23E-05	-1.58E-02
Waste categories																
HWD	kg	8.13E-08	1.76E-09	3.73E-10	ND	1.52E-10	0.00	0.00	0.00	0.00	0.00	0.00	6.83E-11	1.70E-08	3.29E-11	5.15E-08
NHWD	kg	0.92	5.91E-03	6.30E-02	ND	1.63E-03	0.00	0.00	0.00	0.00	0.00	0.00	2.29E-04	9.81E-03	0.69	-0.31
RWD	kg	1.94E-03	8.17E-05	2.63E-05	ND	3.15E-06	0.00	0.00	0.00	0.00	0.00	0.00	3.17E-06	1.56E-03	9.25E-07	3.73E-04
Output material flows																
CRU	kg	0.00	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MFR	kg	1.28	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.10	0.00	0.00
MER	kg	0.00	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EEE	MJ	9.42E-02	0.00	3.42	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EET	MJ	4.36E-02	0.00	6.17	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Key:
GWP-t – global warming potential - total **GWP-f** – global warming potential fossil fuels **GWP-b** – global warming potential - biogenic **GWP-l** – global warming potential - land use and land use change **ODP** – ozone depletion potential **AP** - acidification potential **EP-fw** - eutrophication potential - aquatic freshwater **EP-m** - eutrophication potential - aquatic marine **EP-t** - feutrophication potential - terrestrial **POCP** - photochemical ozone formation potential **ADPF*²** - abiotic depletion potential – fossil resources **ADPE*²** - abiotic depletion potential – minerals&metals **WDP*²** – Water (user) deprivation potential **PERE** - Use of renewable primary energy **PERM** - use of renewable primary energy resources **PERT** - total use of renewable primary energy resources **PENRE** - use of non-renewable primary energy **PENRM** - use of non-renewable primary energy resources **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 **HWD** - hazardous waste disposed **NHWD** - non-hazardous waste disposed **RWD** - radioactive waste disposed **CRU** - components for re-use **MFR** - materials for recycling **MER** - materials for energy recovery **EEE** - exported electrical energy **EET** - exported thermal energy **ND** – not included

Results per 1 m² of steel and stainless steel frames Type 3A (PG3)																
	Unit	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Additional environmental impact indicators																
PM	Disease incidence	9.66E-07	8.81E-08	2.90E-09	ND	7.30E-10	0.00	0.00	0.00	0.00	0.00	0.00	1.68E-09	1.17E-08	9.28E-10	-6.65E-07
IRP*[1]	kBq U235-Äqv.	0.23	1.16E-02	3.87E-03	ND	3.13E-04	0.00	0.00	0.00	0.00	0.00	0.00	4.50E-04	0.24	9.89E-05	-6.11E-03
ETP-fw*[2]	CTUe	88.83	53.70	0.29	ND	1.02	0.00	0.00	0.00	0.00	0.00	0.00	2.08	2.65	8.16E-02	-27.00
HTP-c*[2]	CTUh	3.57E-08	7.27E-10	2.44E-11	ND	1.71E-11	0.00	0.00	0.00	0.00	0.00	0.00	2.81E-11	1.79E-10	1.74E-12	-3.17E-08
HTP-nc*[2]	CTUh	1.39E-07	4.06E-08	1.33E-09	ND	3.49E-10	0.00	0.00	0.00	0.00	0.00	0.00	1.58E-09	5.59E-09	6.79E-11	3.20E-08
SQP*[2]	dimensionless.	217.09	18.20	0.18	ND	2.02E-02	0.00	0.00	0.00	0.00	0.00	0.00	0.71	4.71	4.26E-02	2.47

Key:
PM – particulate matter emissions potential **IRP*[1]** – ionizing radiation potential – human health **ETP-fw*[2]** - Eco-toxicity potential – freshwater **HTP-c*[2]** - Human toxicity potential – cancer effects **HTP-nc*[2]** - Human toxicity potential – non-cancer effects **SQP*[2]** – soil quality potential **ND** – not included

Disclaimers

*1 This impact category deals mainly with the eventual impact of low-dose ionising 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 ionising radiation from the soil. from radon and from some building materials is also not measured by this indicator

*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 experience with the indicator

6.4 Interpretation. LCA presentation and critical review

Evaluation

The environmental impacts of

- Frames for hinged doors
- Frames for glazing frames
- Frames for sliding doors

differ considerably from each other. The differences lie in the various intermediate products and raw materials used, as well as in the quantities of those intermediate products and raw materials. The frames for hinged doors (PG1) and sliding doors (PG3) are similar in material composition, but differ in the use of hinges and seals in PG1 and the additional amount of steel in the form of a steel cover in PG3. Differences between the glazing frame (PG2) and those of the other two product groups result, among other things, from the use of aluminum glazing beads.

The environmental impacts during the manufacture of frames result mainly from the use of steel. For frames for hinged doors (PG1), environmental impacts arise primarily from the use of door hinges, and for frames for glazing (PG2), from the use of aluminum profiles and their respective upstream chains. The use of powder coating has a moderate impact across all product groups, as does the seal in the case of frames for hinged doors (PG1) and frames for glazing (PG2).

Furthermore, transportation plays a key role in Module A4 across all product groups.

Replacing the seals on frames for hinged doors (PG1) and glazing frames (PG2) over a 50-year period has a moderate impact during the service life.

In scenario C4, only marginal expenditures for the physical pretreatment and the landfill operation are to be expected. In the case of landfill, it is not possible to allocate the waste to individual raw materials, as the landfilled portion is set at a flat rate of 5% from Module C1.

When recycling the products, around 23% (PG1), 20% (PG2), and 37% (PG3) of the environmental impacts of the core indicators (without WDP, as not supported by the software) occurring in the life cycle can be credited in scenario D for steel. In addition, approximately 5% (PG1) can be credited for the zamak content of the door hinges and approximately 20% (PG2) for the aluminum content.

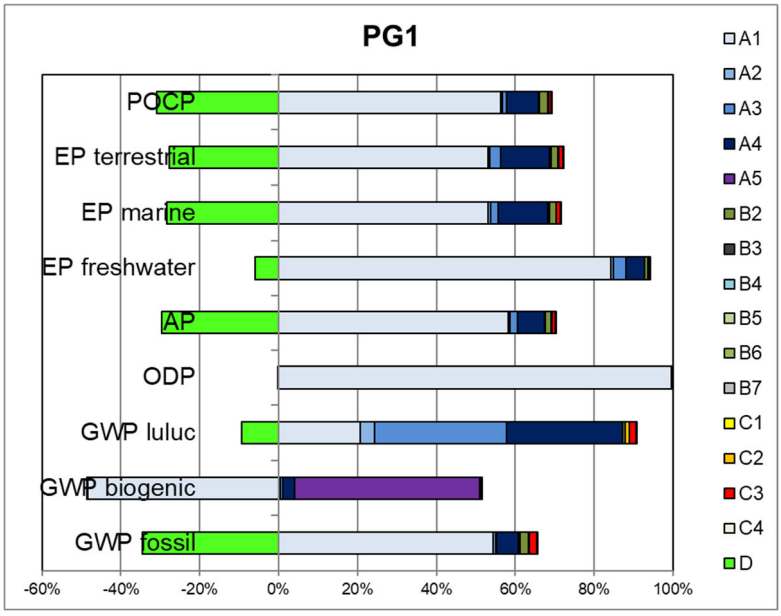
Some LCA results differ considerably from the results presented in the EPD prepared five years ago. The reasons for this are

- Recycled steel as a raw material
- Changing the background data in “LCA for Experts”
- Use of other, more appropriate datasets “LCA for Experts”
- New data collection by the declaration holder
- Update of the modeling principles due to the transition from EN 15804:A1 to EN 15804:A2
- Replacement of individual components in Module B2 instead of Module B3

The charts below show the distribution of the main environmental impacts.

The values obtained from the LCA calculation are suitable for the certification of buildings.

Charts
The following charts illustrate the nine key environmental indicators in relation to the life-cycle modules.



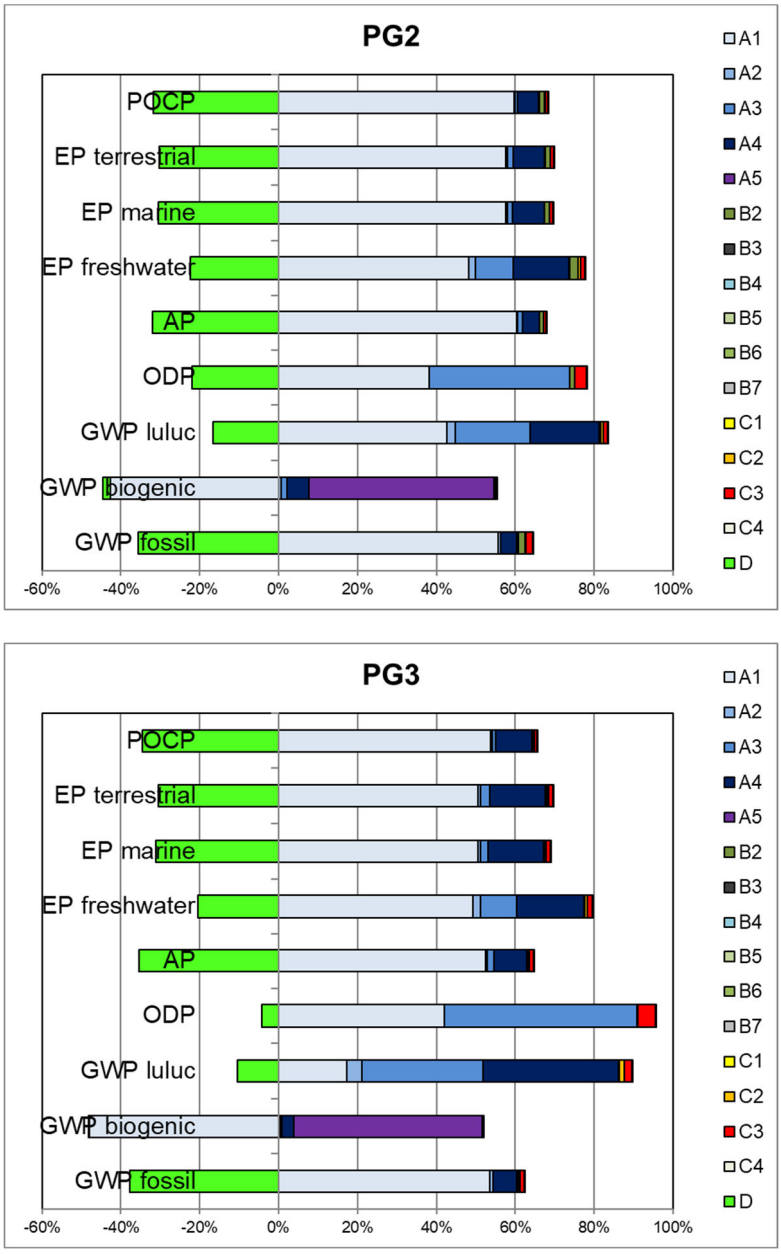


Illustration 3 Percentage of the modules in selected environmental impact indicators

Report

The LCA report underlying this EPD was developed according to the requirements of DIN EN ISO 14040 and DIN EN ISO 14044 as well as DIN EN 15804 and DIN EN ISO 14025. It is deposited with ift Rosenheim. The results and conclusions reported to the target group are complete, correct, without bias and transparent. The results of the study are not designed to be used for comparative statements intended for publication.

Critical review

The critical review of the LCA and the report took place in the course of verification of the EPD and was carried out by Dipl.-Wi.Jur. (FH), M. Sc. Susanne Volz, an external verifier.

7 General information regarding the EPD

Comparability

This EPD was prepared in accordance with DIN EN 15804 and is therefore only comparable to those EPDs that also comply with the requirements set out in DIN EN 15804.
Any comparison must refer to the building context and the same boundary conditions of the various life cycle stages.
For comparing EPDs of construction products, the rules set out in DIN EN 15804, Clause 5.3, apply.

The reference products recognised in the balance sheet were identified using the worst-case approach and considered representative of the product group. The results of individual products within the product group differ from the results of the reference products. Identification of the product groups and the resulting variations are documented in the background report.

Communication

The communications format of this EPD meets the requirements of EN 15942:2012 and is therefore the basis for B2B communication. Only the nomenclature has been changed according to DIN EN 15804.

Verification

Verification of the Environmental Product Declaration is documented in accordance with the ift "Richtlinie zur Erstellung von Typ III Umweltproduktdeklarationen" (Guidance on preparing Type III Environmental Product Declarations) in accordance with the requirements set out in DIN EN ISO 14025.

The Declaration is based on the PCR documents EN 17213 “PCR for windows and doors, “PCR Part A” PCR-A-2.1:2025 and "Doors and gates” PCR-TT-3.2:2023.

The European standard EN 15804 serves as the core PCR [a)]
Independent verification of the declaration and statement according to EN ISO 14025:2010
Independent third party verifier: [b)] Susanne Volz
[a)] Product category rules [b)] Optional for business-to-business communication Mandatory for business-to-consumer communication (see EN ISO 14025:2010, 9.4)

Revisions of this document

No.	Date	Note	Person in charge	Verifier
1	18.06.2026	External verification	Hannemann	Volz
2	07.07.2026	Editorial amendment	Hannemann	-/-

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9 Annex

Description of life cycle scenarios for Steel and stainless steel frames

Product stage			Con-struction stage		Use stage*							End-of-life stage				Benefits and loads from beyond the system boundaries
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Raw material supply	Transport	Manufacture	Transport	Construction/installation process	Use	Maintenance	Repair	Replacement	Modification/refurbishment	Operational energy use	Operational water use	Deconstruction/demolition	Transport	Waste processing	Disposal	Re-use Recovery Recycling potential
✓	✓	✓	✓	✓	—	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

* For declared B-modules, the calculation of the results is performed taking into account the specified RSL related to one year

Table 9 Overview of applied life cycle stages

The scenarios were calculated taking into account the defined RSL (see Point 4 Use stage).

The scenarios were based on information provided by the manufacturer. Furthermore, the scenarios of the research project "EPDs für transparente Bauelemente“ (EPDs for transparent building components) (1) as well as EN 17213 were used. (2)

Note: The standard scenarios selected are presented in bold type. They were also used for calculating the indicators in the summary table.

✓ Included in the LCA
— Not included in the LCA

A4 Transport

No.	Scenario	Description
A4.1	**Small batches through local manufacturers**	**As per EN 17213: 7.5 t truck (Euro 0-6 mix), diesel, 2.7 t payload, full capacity[1], approx. 50 km to site and empty return trip and 7.5 t truck (Euro 0-6 mix), diesel, 2.7 t payload, 20% load capacity[1], approx. 50 km to site and empty return trip. A total of 200 km.**

[1] Capacity used: used loading capacity of truck

A4 Transport to construction site	Transport weight [kg/m²]	Density [kg/m³]	Volume capacity utilisation factor[2]
PG1	11.89	67.53	<1
PG2	12.30	69.90	<1
PG3	15.18	86.26	<1

[2] Volume capacity utilisation factor:
= 1 Product fills the packaging completely (without air inclusion)
< 1 Packaging contains unused volume (e.g. air, filling material)
> 1 Product is packed in compressed form

Since this is a single scenario, the results are shown in the relevant summary table.

A5 Construction/installation process

No.	Scenario	Description
A5.1	**Manual**	**According to the manufacturer, the products are installed without additional lifting and auxiliary devices**

In case of deviating consumption during installation/assembly of the products which forms part of the site management, they are covered at the building level.

Ancillary materials, consumables, use of energy and water, other resource use, material losses, direct emissions as well as waste during construction / installation are negligible.

It is assumed that the packaging material in the module “construction / installation” is sent to waste handling. Waste is only thermally recycled in line with the conservative approach: Films/foils / protective covers, wood and cardboard in waste incineration plants. Benefits from A5 are specified in module D. Benefits from incineration plant: Electricity replaces electricity mix (RER) (Residual-Mix); Thermal energy replaces thermal energy from European natural gas (RER). Transport to the recycling plants is not taken into account.

Since this is a single scenario, the results are shown in the relevant summary table.

B2 Cleaning, maintenance and repair

Module B2 assesses the effort required for cleaning, maintenance, and upkeep of a building component to preserve its functional, technical, and aesthetic quality. The replacement of worn parts and components is also covered in Module B2. The results are reported cumulatively for the component's RSL.

B2.1 Cleaning

No.	Scenario	Description
B2.1	**Rarely manual**	**Manual using suitable cleaning agents as specified by the manufacturer, yearly.** **Cleaner: 0.17 l/RSL** **Water: 3.51 l/RSL** (EN 17074)

Further ancillary materials, consumables, use of energy, material losses and waste as well as transport distances during cleaning are negligible.

The results are reported cumulatively on the RSL.

The required amount of cleaning solution was adjusted based on the percentage of a window frame relative to one square meter.

Since this is a single scenario, the results are shown in the summary table.

B2.2 Maintenance and repair

No.	Scenario	Description
B2.2	**Normal use**	**Annual functional test, visual inspection, lubrication/greasing and repair if necessary** **0.125 kg lubricant per 50 yr (RSL)** (1)* **One-time replacement*:** • **Sealants 0.21 kg**

* Assumptions for evaluation of possible environmental impacts; statements made do not constitute any guaranty or warranty of performance.
For updated information refer to the relevant manufacturer "*instructions for assembly/installation, operation and maintenance".*

Half the amount of lubricant is used, since only the hinge pocket on the frame is being considered.

For product groups 2 and 3, no lubricant is used because no hinge pockets are installed.

For product group 3, replacement of the gaskets is not taken into account, as no gaskets are installed in the product.

For Module B2.2, the costs associated with maintenance and the replacement of those components of a building element whose service life is shorter than the specified RSL are accounted for. Assumptions regarding the RSL for components are based on the BBSR table "Service Life of Building Components for Life Cycle Analysis According to BNB (Assessment method for sustainable buildings)." The results are reported cumulatively for the component's RSL.

Transport to the recycling plants is not taken into account.

Other ancillary materials, consumables, use of energy and water, waste, material losses and transport distances during service and maintenance are negligible.

Since this is a single scenario, the results are shown in the summary table.

B3 Repair (not relevant)

No.	Scenario	Description
B3	Normal use and heavy use	**As per EN 17213:** **Repair of accidental damage (e.g. broken glass panes or damaged building hardware) shall only be considered if the place of installation is known and justification is provided for expecting accidental damage (e.g. schools).**

Ancillary materials, consumables, use of energy and water, waste, material losses and transport distances during repair are negligible.

The results are reported cumulatively for the component's RSL.

Since this is a single scenario, the results are shown in the relevant summary table.

B4 Replacement (not relevant)

The complete replacement of building components at the end of their service life (RSL) is accounted for at the building level.

The special case described in EN 17213—“Replacement of the entire window or door following the reference service life of individual components (e.g., seals, hardware, IGU)”—does not apply.

The results are reported cumulatively for the component's RSL.

Since this is a single scenario, the results are shown in the summary table.

B5 Modification/refurbishment (not relevant)

According to the manufacturer, the elements are not included in the improvement / modernisation activities for buildings.

For updated information refer to the respective instructions for assembly/installation, operation and maintenance from rema AG / spa.

Ancillary materials, consumables, use of energy and water, material losses, waste as well as transport distances during installation are negligible.

Since this is a single scenario, the results are shown in the relevant summary table.

B6 Operational energy use (not relevant)

There is no energy used during normal use. The products are opened by manual control.
There is no transport consumption for energy use in buildings. Ancillary materials, consumables and water, waste materials and other scenarios are negligible.

Since this is a single scenario, the results are shown in the relevant summary table.

B7 Operational water use (not relevant)

There's no water consumption when used as intended. Water consumption for cleaning is specified in module B2.1.

There is no transport consumption for water use in buildings. Ancillary materials, consumables, waste materials and other scenarios are negligible.

Since this is a single scenario, the results are shown in the relevant summary table.

C1 Deconstruction. demolition

No.	Scenario	Description
C1	**Deconstruction**	**As per EN 17213 (metal doors):** **95 % deconstruction** **5 % residues** **Further deconstruction rates are possible, give adequate reasons.**

No relevant inputs or outputs apply to the scenario selected. The energy consumed for deconstruction is negligible. Any arising consumption is marginal.

Since this is a single scenario, the results are shown in the relevant summary table.

In case of deviating consumption the removal of the products forms part of the site management and is covered at the building level.

C2 Transport

No.	Scenario	Description
C2	**Transport**	**Transport to collection point using 34-40 t truck (Euro 0-6 mix), diesel, 27 t payload, 50% capacity used, 100 km.** (1)

Since this is a single scenario, the results are shown in the relevant summary table.

C3 Waste management

No.	Scenario	Description
C3	**Current market situation**	**Share for recirculation of materials:** • **Metals 100% recycling** (EN 17213) • **Plastics 100% thermal recycling with energy recovery** (EN 17213)

Electricity consumption of recycling plant: 0.5 MJ/kg.

As the products are placed on the European market, the disposal scenario is based on average European data sets. Where no European data sets were available, German data sets were used.

The below table presents the disposal processes and their percentage by mass/weight. The calculation is based on the above mentioned proportions in percent related to the declared unit of the product system.

C3				
C3 Disposal	**Unit**	**PG1**	**PG2**	**PG3**
Collection process, collected separately	kg	10.23	11.06	13.07
Collection process, collected as mixed construction waste	kg	0.54	0.58	0.69
Recovery system, for reuse	kg	0.00	0.00	0.00
Recovery system, for recycling	kg	10.03	10.78	13.10
Recovery system, for energy recovery	kg	0.20	0.28	0.00
Disposal	kg	0.54	0.58	0.69

Since this is a single scenario, the results are shown in the summary table.

C4 Disposal

No.	Scenario	Description
C4	**Market situation**	**The non-recordable amounts and losses within the reuse/recycling chain (C1 and C3) are modelled as “disposed” (RER).**

The consumption in scenario C4 results from physical pre-treatment, waste recycling and management of the disposal site. The benefits obtained here from the substitution of primary material production are allocated to module D, e.g. electricity and heat from waste incineration.

Since this is a single scenario, the results are shown in the summary table.

D Benefits and loads from beyond the system boundaries

No.	Scenario	Description[1]
D1	**Recycling potential (current market situation)**	**Steel scrap from C3 excluding the scrap used in A3 replaces 70.2% of steel; Aluminium scrap from C3 excluding the scrap used in A3 replaces 70.2% of aluminium; Zamak scrap from C3, excluding the scrap used in A3, replaces 60% of Zamak; Benefits from incineration plant: Electricity replaces electricity mix (RER) (Residual-Mix); Thermal energy replaces thermal energy from European natural gas (RER).**

[1] Applied value correction factor of 70.2% according to metal-specific data set, 60% according to standard data set for other materials.

The values in module D result from recycling of the packaging material in module A5 and from deconstruction at the end of service life.

Since this is a single scenario, the results are shown in the summary table.

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Notes
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