EPD®
THE INTERNATIONAL EPD® SYSTEM

ECO PLATFORM EPD VERIFIED

Environmental Product Declaration

Katherm QK

Manufactured by **Kampmann GmbH & Co. KG** in accordance with ISO 14025 and EN 15804:2012+A2:2019

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An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com.

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EPD Information

Programme information<
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Programme Information

ISO standard ISO 21930 and CEN standard EN 15804 serves as the core Product Category Rules (PCR)

Product Category Rules (PCR):

PCR 2019:14 Construction products, version 1.2.5, Construction EN 15804:2012 + A2:2019 Sustainability of Construction Works

PCR review was conducted by: The Technical Committee of the International EPD® System. Review chair: Claudia A. Peña, University of Concepción, Chile

EPDs within the same product category but registered in different EPD programmes may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison.

Third-party verification

Independent third-party verification of the declaration and data, according to ISO 14025:2006, via:

EPD verification by individual verifier

Third party verifier: Prof. Ing. Vladimír Koçí, Ph.D., MBA, LCA Studio Šárecká 5,16000 Prague 6 - Czech Republic

Approved by: The International EPD® System

Procedure for follow-up of data during EPD validity involves third party verifier:

Yes x No

Kampmann GmbH & Co. KG has the sole ownership, liability, and responsibility for this EPD.

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How to read this EPD?

An Environmental Product Declaration (EPD) is an ISO Type III Environmental Declaration based on ISO 14025 standard. An EPD transparently reports the environmental performance of products or services from a lifecycle perspective. The preparation of an EPD includes different stages, from acquiring raw materials to the end of life of the final product/service. EPDs are based on international standards and consider the entire value chain. Additionally, EPD is a third-party verified document. This EPD includes several sections described below.

1. General and Program Information

The first part of an EPD has information about the name of the manufacturer and product/service and other general information such as the validity and expiration dates of the document, the name of the program operator, geographical scope, etc. The second page states the standards followed and gives information about the program operator, third-party verifier, etc. The followed Product Category Rule (PCR) is indicated on the second page.

2. Company and Product/Service Information

Information about the company and the investigated product is given in this section. It summarizes the characteristics of the product provided by the manufacturer. It also includes information about the product such as product composition and packaging.

3. LCA Information

LCA information is one of the most important parts of the EPD as it describes the functional/declared unit, time representativeness of the study, database(s) and LCA software, along with system boundaries.

The table presented in this part has columns for each stage in the life cycle. The considered stages are marked 'X' whereas the ones that are not considered are labeled as 'NR' (Not Relevant). Not all EPDs consider the full life cycle assessment for a product's entire life stages. The 'System Boundary' page is also the place where one can find detailed information about the stages and the assumptions made.

4. LCA Results

The results of the Life Cycle Assessment analysis are presented in table format. The first column in each table indicates the name of the impact category and their measurement units are presented in the second column. These tables show an amount at each life cycle stage to see the impact of different indicators on different stages. Each impact can be understood as what is released through the production of the declared unit of the material—in this case, 1 kW of heat output. The benefits of reuse/recycling of the declared product is reflected in this section.

The first impact in the table is global warming potential (GWP), which shows how much CO_2 is released at each stage. Other impacts include eutrophication potential, acidification potential, ozone layer depletion, land use related impacts, etc. The second table provides results for resource use and the third table is about the waste produced during the production. The fourth and final table shows the results for the GWP-GHG indicator, which is almost equivalent to the GWP-Total indicator mentioned previously. The only difference is that this indicator excludes the biogenic carbon content by following a certain methodology.

About

About the Kampmann Group

The whole is more than the sum of its parts. The Kampmann Group shows why.

Kampmann GmbH & Co. KG develops, produces and sells high-quality, customised systems for heating, cooling and ventilating buildings. Kampmann has set itself the goal of creating a feel-good climate in cooperation with its customers and partners. For this reason, the company's employees work for a good climate, for innovations, for sustainability and for cooperation with customers and partners in a spirit of partnership. In terms of sustainability, the goal for our products is to operate as efficient as possible, have a long service life, be versatile and be made of recyclable materials. The company is certified according to DIN EN 9001 and DIN EN ISO 50001.

The company's main site is located in Lingen (DE). In addition, the company has a production site in Łęczyca (PL). The product groups include trench units, fan coils, unit heaters, door air curtains, decentralised ventilation units and air diffusers. The areas of application are, for example, office buildings, commercial and industrial buildings, hotels, retail chains, sales buildings and multi functional halls.

About Katherm QK

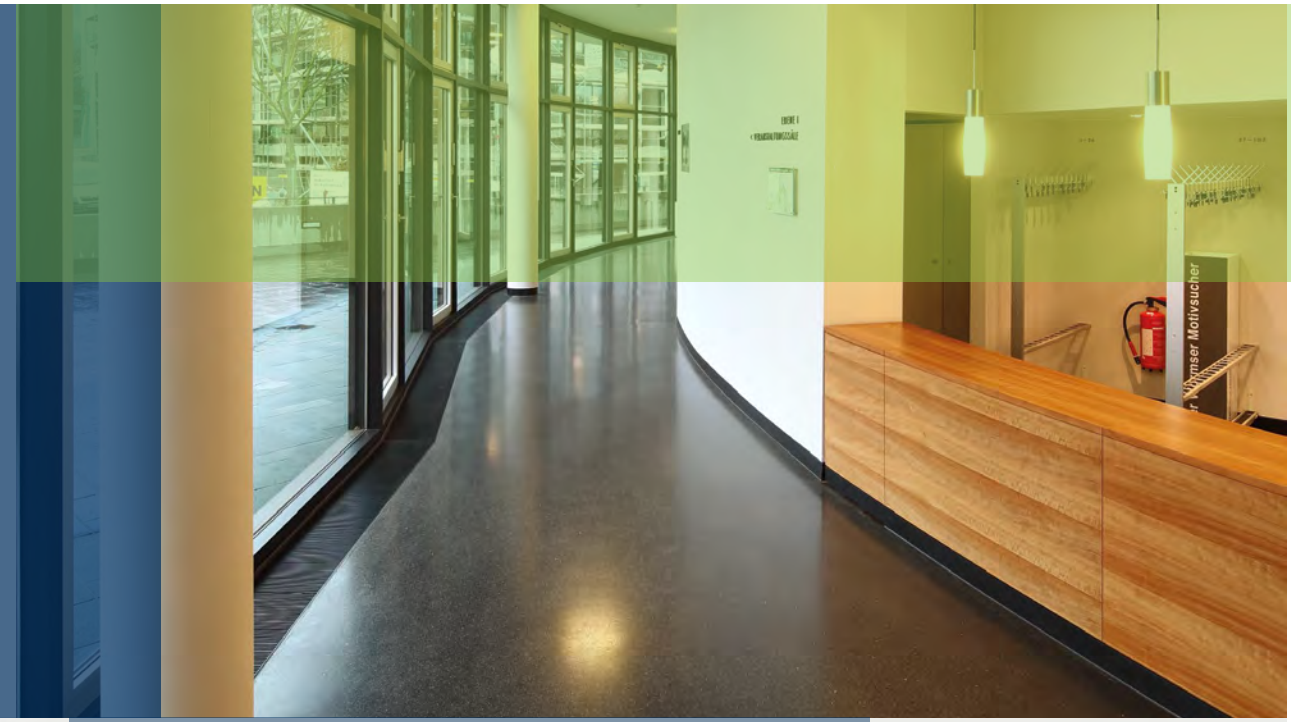
Plenty of heat from minimal dimensions

Trench units are mounted in the floor along floor-to-ceiling window surfaces. In combination with modern heating systems, effective and energy-saving heating of rooms can be achieved by the Katherm QK. The room air is drawn in by the fan, guided over the parallel convector and blown out into the room. The convector arranged on the window side ensures optimum cold air screening of the window, so that the heated air flows into the room without draughts.

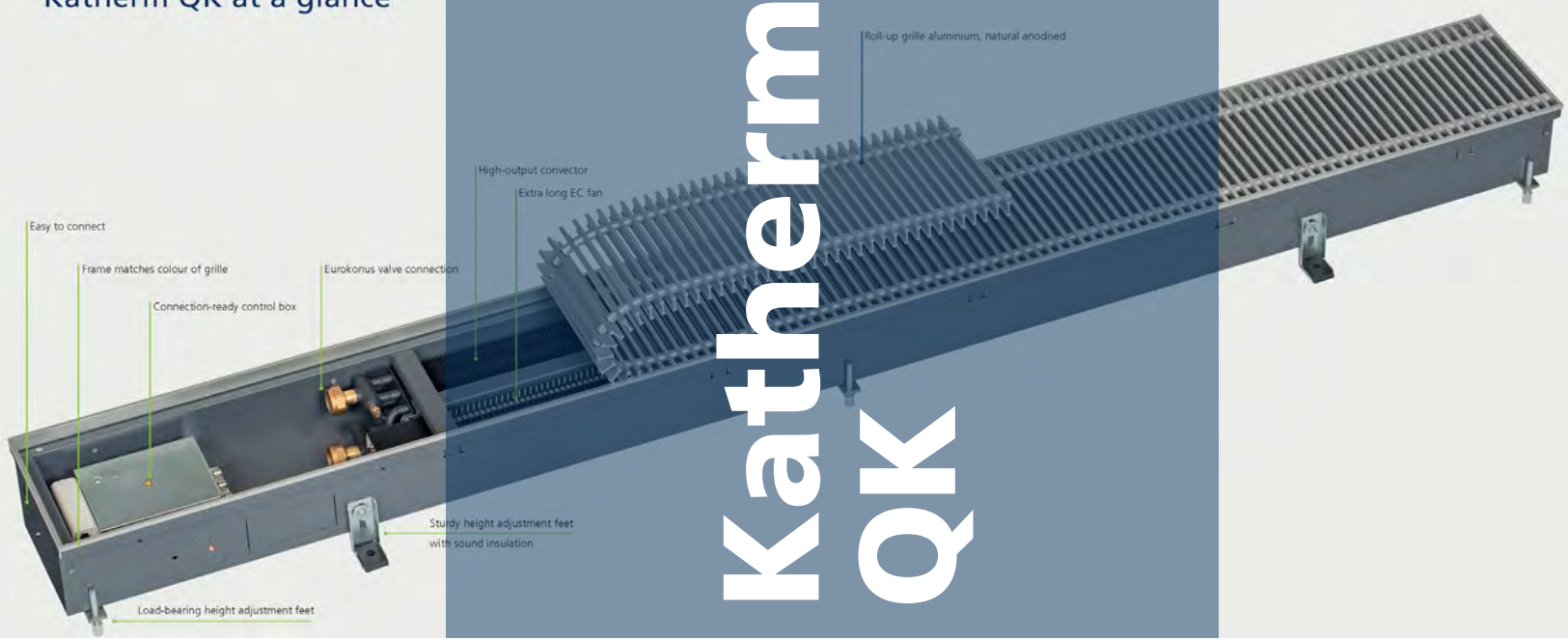
The Katherm QK is available in various duct widths, heights and lengths for heating the room as required. The unit has a convector, which consists of round copper pipes with aluminium fins and through which hot water flows. The EC cross-flow fan installed in the Katherm QK ensures that air flows evenly through the convector. The fan is controlled by a stepless speed control via an external 0-10 V signal.

The units are also equipped with an electrotechnical control system to enable the units to be regulated according to the customer's requirements. The unit components are mounted in a floor trench, which is covered by a roll-up grille or a linear grille. This decorative cover of the trench unit is available in aluminium, brass, stainless steel and wood. The Katherm QK trench unit is used to heat rooms with large window areas. Exemplary areas of application for the unit are hotels, offices, sales and exhibition rooms.

All areas of buildings in which effective heating and cold air screening is required. Effective, energy-saving heating can be provided by Katherm QK in conjunction with modern heating systems.



Katherm QK at a glance



Katherm QK

About Katherm QK

Kampmann GmbH & Co. KG produces Katherm QK in various sizes and grille types. This EPD is specific for Katherm QK 190/112/1000 with the oak wood grille. These product dimensions are selected since they have the worst environmental performance of the product range. Hence, the rest of the product range (with wooden grilles) is covered by disclosing the environmental performance of this reference product. The rest of the product range has a lower environmental impact compared to the reference product. LCA results can be upscaled for different product weights and grille options and can be provided by Kampmann GmbH & Co. KG upon request.

Product Composition

Product composition of Katherm QK is shown in the table below. For the packaging of the final product, softwood is used. 0.795 kg of softwood is used per functional unit.

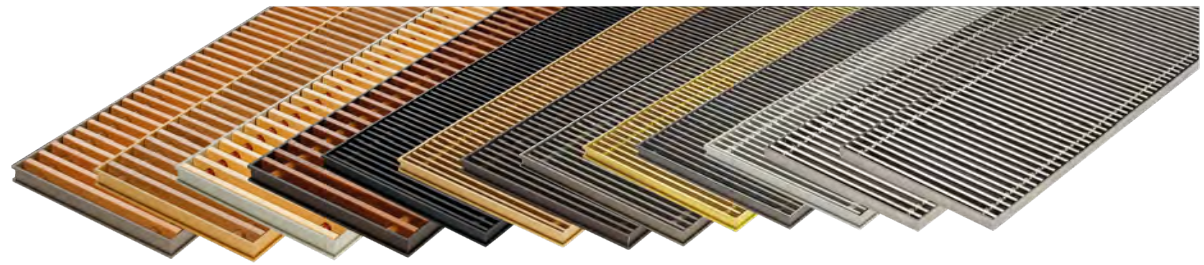
Composition percentages by weight

Steel	70.7%
Aluminium	11.2%
Wood	8.74%
Copper	3.34%
PSU (Power Supply Unit)	1.98%
Polypropylene (PP)	1.80%
Polyamide (PA)	0.74%
Polyurethane paint	0.41%
Polyvinylchloride (PVC)	0.30%
PCB (Printed circuit board)	0.20%
Other plastics	0.20%
Neodym	0.15%
Styrene-butadiene rubber (SBR)	0.12%
Rest	< 1 %

Grille Options

- Grille beech
- Grille maple
- *Grille oak
- Grille merbau
- Grille aluminium black anodised
- Grille aluminium brass anodised
- Grille aluminium bronze anodised
- Grille aluminium bronzed
- Grille aluminium coated DB703
- Grille aluminium natural anodised
- Grille brass nature
- Grille stainless steel natural
- Grille stainless steel polished

*Used for this EPD.



Heat Outputs

The heat outputs were measured and determined in accordance with DIN EN 16430 “Fan-assisted radiators, convectors and trench convectors”.

Part 1 “Technical specifications and requirements”
Part 2 “Test method and evaluation of heat output”

The specific requirements for trench heating are taken into account in DIN EN 16430. The reference air temperature is measured in the centre of the test chamber (2 metres from the external wall) at a height of 0.75 metres. The surface temperature of the façade is 16°C. Experience has shown that the underfloor convector is positioned at a distance of 50 mm from the façade.

Acoustics

Katherm QK are very often used in acoustically sensitive areas. Accordingly, Katherm QK have been optimised in terms of noise levels (Determination of the sound power and sound energy levels of sources of sound from sound pressure measurements – precision 2 class of enveloping measurement surface for an essentially free sound field over a reflective plane). The sound power level is measured according to DIN EN ISO 3744 in a semi-low reflective sound measuring chamber.

System Boundary

System Boundary

A1 - Raw Material

This stage includes raw materials extraction and pre-treatment processes before production. Main materials used in the product are steel, wood, aluminium, copper and various types of plastics. Environmental impacts of these materials are considered in this stage.

A2 - Raw Material Transport

This stage is relevant for the delivery of raw materials to the production plant and within the plant. Highway transport is the dominant mean of transport at this stage. Transport routes and distances are supplier-specific and provided by the manufacturer.

A3 - Manufacturing

The following production steps are included: production of the required sheet metal parts in the sheet metal prefabrication, final assembly of the sheet metal parts and the other components of the product, testing of products according to the quality management system DIN EN ISO 9001 and packing of the products for the final shipment.

A4 - Transport to Site

This stage is relevant for the delivery of final product to the intended markets and customers. Highway, seaway and airway transportation are involved in this stage. The transport routes and distances are supplier-specific and provided by the manufacturer.

A5 - Installation

This module considers the environmental impacts during the installation of the product within the building. In the general case, two steel screws and two plastic dowels are used during the installation. Their impacts are calculated and represented in this stage.

System Boundary

B2 - Maintenance

Maintenance of the product is necessary during the service life of the product. According to the manufacturer, a typical maintenance cycle requires two times cleaning per year. During each cleaning, the product is vacuumed for approximately 10 minutes. In addition, a common cleaning agent (around 10 ml per cleaning) is also used. Thus, the impact of vacuuming and using a cleaning agent are considered and their impacts are represented by the functional unit.

B3 - Repair

In general, repairing of minor optical damages with a bit of paint is needed during the product's service life. The material used for repairing is approximately 30 ml of paint in 5 years. The impact of using paint repair is represented by the functional unit.

B4 - Replacement of Parts

According to the manufacturer, the fan and valves have to be replaced every 10 years and the PCB every 15 years. Thus, these impacts based on the material level are analysed and represented by the functional unit.

B6 - Energy Use

Considering the optimum working conditions of the product both for heating and cooling demands and product's service life (20 years), product's energy use is determined. The UK electricity grid mix is considered since the EPD is mainly aimed at the UK market. Thus, energy use-related impacts are represented by the functional unit.

C1 - De-construction

This stage includes the impacts during the dismantling of Katherm QK from the building. It is assumed that no energy and additional material are needed for the dismantling of the product.

C2 - Waste Transport

This stage includes the transportation of discarded products to the waste processing/disposal area. 50 km distance by trucks is assumed.

C3 - Waste Processing

The product mainly consists of two parts: plastics and metals. Plastics are assumed to be 100% incinerated with heat recovery and metal parts such as steel, aluminium, copper and brass are assumed to be recycled with 76%.

C4 - Disposal

The remaining metal parts (24% of the metals) are landfilled. Its impacts are included in this stage.

D - Future reuse, recycling and energy recovery potentials

Metals that are recycled are assumed to substitute the use of virgin metals. In addition, the benefits of heat recovery from the incineration of plastics are included.

LCA Information

LCA Information

Functional Unit

1 kW heat output at 75 °C water inlet, 65 °C water outlet and 20 °C reference air temperature and maximum fan speed (10 V).

System Boundary

Cradle to grave and module D (A + B + C + D)

Cut-Off Rules

1% cut-off is applied. Data for elementary flows to and from the product system contributing to a minimum of 99% of the declared environmental impacts have been included.

REACH Regulation

No substances included in the Candidate List of Substances of Very High Concern for authorization under the REACH regulations are present in this product either above the threshold for registration with the European Chemicals Agency or above 0.1% (wt/wt).

Background Data

For all LCA modelling and calculation, Ecoinvent database (v3.8) and SimaPro (v9.3) LCA software were used.

LCA Modelling, Calculation and Data Quality

The results of the LCA with the indicators as per EPD requirements are given in the LCA result tables. All energy calculations were obtained using Cumulative Energy Demand (LHV) methodology, while freshwater use is calculated with selected inventory flows in SimaPro according to the PCR. There are no co-product allocations within the LCA study underlying this EPD. The regional energy datasets were used for all energy calculations. For use phase energy calculations, environmental impacts are calculated for one year of operation and UK electricity grid mix is used as the EPD is mainly aimed at the UK market.

Period Under Review

The data used for LCA study concerns the year 2021.

Allocations

Energy consumption and raw material transportation were weighted according to 2021 production figures. In addition, hazardous and non-hazardous waste amounts were also allocated from the total waste generation in 2021.

LCA Information

	Product Stage			Construction Process Stage		Use Stage							End of Life Stage				Benefits and Loads
	Raw Material Supply	Transport	Manufacturing	Transport	Construction Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational Energy Use	Operational Water Use	Deconstruction / Demolition	Transport	Waste Processing	Disposal	Future reuse, recycling or energy recovery potentials
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules Declared	X	X	X	X	X	NR	X	X	X	NR	X	NR	X	X	X	X	X
Geography	GLO	GLO	PL	GLO	GLO	-	GLO	GLO	GLO	-	UK	-	GLO	GLO	GLO	GLO	GLO
Specific Data Used	>90%					-	-	-	-	-	-	-	-	-	-	-	-
Variation - Products	0%					-	-	-	-	-	-	-	-	-	-	-	-
Variation - Sites	0%					-	-	-	-	-	-	-	-	-	-	-	-

(X = Module included, NR = Not revelant)

LCA Results

LCA Results

Impact Category	Unit	A1	A2	A3	A1-A3	A4	A5	B2	B3	B4	B6	C1	C2	C3	C4	D
GWP - Fossil	kg CO_2 eq	3.74E+01	1.29E+00	1.75E+00	4.04E+01	1.71E+00	3.63E-01	1.66E-01	4.18E-02	7.61E-01	3.44E+00	0.00E+00	5.84E-02	1.92E+00	2.89E-02	-2.38E+01
GWP - Biogenic	kg CO_2 eq	-2.59E+00	3.12E-03	-1.65E+00	-4.23E+00	2.22E-03	3.14E-03	7.16E-03	-4.17E-03	-1.79E-03	4.76E-01	0.00E+00	1.41E-04	3.69E-04	2.92E-04	-1.82E-02
GWP - Luluc	kg CO_2 eq	3.37E-01	4.85E-04	1.54E-03	3.39E-01	2.77E-04	3.63E-04	3.26E-03	9.71E-03	6.37E-03	4.71E-03	0.00E+00	2.19E-05	5.29E-05	2.93E-05	-1.97E-01
GWP - Total	kg CO_2 eq	3.51E+01	1.29E+00	1.04E-01	3.65E+01	1.71E+00	3.66E-01	1.77E-01	4.74E-02	7.65E-01	3.92E+00	0.00E+00	5.85E-02	1.92E+00	2.92E-02	-2.40E+01
ODP	kg CFC-11 eq	2.48E-06	3.22E-07	3.28E-08	2.84E-06	3.99E-07	1.55E-08	1.41E-08	3.93E-09	5.91E-08	2.33E-07	0.00E+00	1.46E-08	1.80E-08	8.79E-09	-1.67E-06
AP	mol H+ eq	4.25E-01	4.15E-03	1.26E-02	4.42E-01	8.52E-03	1.51E-03	6.80E-04	3.16E-04	2.34E-02	1.08E-02	0.00E+00	1.86E-04	4.10E-04	2.44E-04	-2.88E-01
EP - Freshwater	kg P eq	3.63E-02	8.38E-05	2.11E-03	3.85E-02	5.17E-05	1.10E-04	3.41E-05	1.43E-05	1.85E-03	5.50E-04	0.00E+00	3.79E-06	1.49E-05	8.39E-06	-2.44E-02
EP - Marine	kg N eq	9.37E-02	9.29E-04	1.90E-03	9.66E-02	2.91E-03	4.09E-04	1.79E-04	6.99E-05	6.58E-03	2.54E-03	0.00E+00	4.16E-05	1.60E-04	8.40E-05	-2.69E-02
EP - Terrestrial	mol N eq	4.89E-01	1.01E-02	1.68E-02	5.16E-01	3.19E-02	3.05E-03	1.63E-03	4.64E-04	1.93E-02	2.81E-02	0.00E+00	4.55E-04	1.63E-03	9.14E-04	-3.07E-01
POCP	kg NMVOC	1.40E-01	2.59E-03	4.49E-03	1.47E-01	7.74E-03	8.24E-04	3.55E-04	1.46E-04	4.92E-03	6.46E-03	0.00E+00	1.16E-04	3.78E-04	2.25E-04	-9.09E-02
**ADPE	kg Sb eq	6.46E-03	3.09E-06	1.96E-06	6.47E-03	1.63E-06	2.23E-06	1.08E-06	6.93E-07	5.13E-04	9.71E-06	0.00E+00	1.40E-07	4.27E-07	9.45E-08	-4.63E-03
**ADPF	MJ	4.78E+02	2.10E+01	1.95E+01	5.18E+02	2.51E+01	7.80E+00	3.95E+00	5.45E-01	1.01E+01	9.16E+01	0.00E+00	9.50E-01	4.58E-01	6.79E-01	-2.97E+02
**WDP	m^3 depriv.	1.23E+01	7.01E-02	2.43E-01	1.26E+01	4.12E-02	4.68E-01	5.21E-02	2.36E-02	5.41E-01	1.23E-01	0.00E+00	3.17E-03	3.05E-02	2.95E-02	-4.19E+00
PM	disease inc.	2.89E-06	1.13E-07	3.99E-08	3.04E-06	5.67E-08	2.45E-08	4.60E-09	2.96E-09	7.96E-08	4.86E-08	0.00E+00	5.11E-09	3.08E-09	4.73E-09	-1.72E-06
*IR	kBq U-235 eq	5.34E+00	1.06E-01	6.59E-02	5.51E+00	1.18E-01	2.54E-02	1.18E-01	2.02E-03	2.12E-01	3.22E+00	0.00E+00	4.80E-03	4.20E-03	3.20E-03	-2.75E+00
**ETP - FW	CTUe	3.08E+03	1.64E+01	2.35E+01	3.12E+03	1.56E+01	8.47E+00	3.26E+00	1.41E+00	2.01E+02	4.27E+01	0.00E+00	7.41E-01	7.47E+00	4.83E-01	-2.03E+03
**HTP - C	CTUh	2.09E-07	4.48E-10	6.40E-10	2.10E-07	2.93E-10	3.71E-09	7.25E-11	7.19E-11	6.71E-09	8.64E-10	0.00E+00	2.02E-11	2.79E-10	2.08E-11	-1.25E-07
**HTP - NC	CTUh	4.37E-06	1.72E-08	2.68E-08	4.41E-06	2.19E-08	1.85E-08	2.04E-09	1.63E-09	3.00E-07	2.46E-08	0.00E+00	7.77E-10	3.47E-09	3.22E-10	-3.13E-06
**SQP	Pt	4.19E+02	2.49E+01	1.11E+02	5.55E+02	1.21E+01	9.91E-01	1.83E+00	8.34E-01	1.48E+01	3.45E+01	0.00E+00	1.13E+00	1.54E-01	1.68E+00	-1.16E+02

Acronyms	GWP-total: Climate change, GWP-fossil: Climate change- fossil, GWP-biogenic: Climate change - biogenic, GWP-luluc: Climate change - land use and transformation, ODP: Ozone layer depletion, AP: Acidification terrestrial and freshwater, EP-freshwater: Eutrophication freshwater, EP-marine: Eutrophication marine, EP-terrestrial: Eutrophication terrestrial, POCP: Photochemical oxidation, ADPE: Abiotic depletion - elements, ADPF: Abiotic depletion - fossil resources, WDP: Water scarcity, PM: Respiratory inorganics - particulate matter, IR: Ionising radiation, ETP-FW: Ecotoxicity freshwater, HTP-c: Cancer human health effects, HTP-nc: Non-cancer human health effects, SQP: Land use related impacts, soil quality.
Legend	A1: Raw Material Supply, A2: Transport, A3: Manufacturing, A4: Transport, A5: Installation, B2: Maintenance, B3: Repair, B4: Replacement, B6: Operational Energy Use, C1: Deconstruction / Demolition, C2: Transport, C3: Waste Processing, C4: Disposal, D: Benefits and Loads Beyond the System Boundary.
*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.

Resource use																
Impact Category	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A4**	**A5**	**B2**	**B3**	**B4**	**B6**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	1.32E+02	2.67E-01	2.13E+01	1.54E+02	1.69E-01	2.72E-01	8.39E-01	1.32E-01	2.64E+00	1.67E+01	0.00E+00	1.21E-02	4.72E-02	1.16E-02	-6.00E+01
PERM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	1.32E+02	2.67E-01	2.13E+01	1.54E+02	1.69E-01	2.72E-01	8.39E-01	1.32E-01	2.64E+00	1.67E+01	0.00E+00	1.21E-02	4.72E-02	1.16E-02	-6.00E+01
PENRE	MJ	4.78E+02	2.10E+01	1.95E+01	5.18E+02	2.51E+01	7.80E+00	3.96E+00	5.57E-01	1.01E+01	9.16E+01	0.00E+00	9.50E-01	4.58E-01	6.79E-01	-2.97E+02
PENRM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	4.78E+02	2.10E+01	1.95E+01	5.18E+02	2.51E+01	7.80E+00	3.96E+00	5.57E-01	1.01E+01	9.16E+01	0.00E+00	9.50E-01	4.58E-01	6.79E-01	-2.97E+02
SM	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	2.78E-01	4.29E-03	6.89E-03	2.89E-01	3.08E-03	9.16E-03	2.85E-03	7.11E-04	2.14E-02	2.20E-02	0.00E+00	1.94E-04	1.06E-03	7.66E-04	-1.48E-01
Acronyms	PERE: Use of renewable primary energy excluding resources used as raw materials, PERM: Use of renewable primary energy resources used as raw materials, PERT: Total use of renewable primary energy, PENRE: Use of non-renewable primary energy excluding 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, SM: Secondary material, RSF: Renewable secondary fuels, NRSF: Non-renewable secondary fuels, FW: Net use of fresh water.															

Waste & Output Flows																
Impact Category	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A4**	**A5**	**B2**	**B3**	**B4**	**B6**	**C1**	**C2**	**C3**	**C4**	**D**
HWD	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NHWD	kg	0.00E+00	0.00E+00	2.86E+00	2.86E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RWD	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.69E+00	0.00E+00	0.00E+00
MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.11E-01	0.00E+00	0.00E+00
EE (Electrical)	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE (Thermal)	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acronyms	HWD: Hazardous waste disposed, NHWD: Non-hazardous waste disposed, RWD: Radioactive waste disposed, CRU: Components for reuse, MFR: Material for recycling, MER: Materials for energy recovery, EE (Electrical): Exported energy electrical, EE (Thermal): Exported energy thermal.															

Climate impact															
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A4**	**A5**	**B2**	**B3**	**B4**	**B6**	**C1**	**C2**	**C3**	**C4**	**D**
*GWP-GHG	kg CO_2 eq	3.65E+01	1.28E+00	1.73E+00	3.95E+01	1.70E+00	3.53E-01	1.65E-01	5.00E-02	7.50E-01	3.41E+00	0.00E+00	5.79E-02	2.89E-02	1.92E+00	-2.31E+01

GWP-GHG = Global Warming Potential total excl. biogenic carbon following IPCC AR5 methodology
*** The indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus equal to the GWP indicator originally defined in EN 15804:2012+A1:2013**

Legend	A1: Raw Material Supply, A2: Transport, A3: Manufacturing, A4: Transport, A5: Installation, B2: Maintenance, B3: Repair, B4: Replacement, B6: Operational Energy Use, C1: Deconstruction / Demolition, C2: Transport, C3: Waste Processing, C4: Disposal, D: Benefits and Loads Beyond the System Boundary.

Glossary of Terms, References & Contact

Glossary of Terms

Global Warming Potential, GWP	Global warming is a concept expressing warming of the atmosphere leading to climate change. One of the human activities which has the greatest effect on global warming is the burning of fossil fuels such as petroleum, coal and natural gas. In LCA, global warming is expressed in terms of the equivalent weight of carbon dioxide (CO_2) emitted.
Ozone Depletion Potential, ODP	Ozone layer depletion is a concept expressing the reduction of ozone in the stratosphere and depletion of the ozone layer (the 'ozone hole') as a consequence of emissions of man-made resources such as CFCs, HCFCs, chlorine, bromine, etc. Damage to the ozone layer reduces its ability to prevent UV light entering the earth's atmosphere, increasing the amount of carcinogenic UVB light hitting the earth's surface. In LCA, ozone layer depletion is expressed in terms of the equivalent weight of CFC-11 emitted.
Acidification Potential, AP	Acidification is an impact category expressing the toxic impact that acidifying substances have on soil, underground water-courses, ground water, organisms, ecosystems and materials. Reaction of acidic gases with water in the atmosphere creates 'acid rain'. The formation of acid rains causes a reduction in biodiversity. In LCA, acidification is expressed in terms of the equivalent weight of sulphur dioxide (SO_2) emitted.
Eutrophication Potential, EP	It is an abnormal proliferation of vegetation in the aquatic ecosystems caused by the addition of nutrients into rivers, lakes or ocean which determinates a lack of oxygen. The eutrophication potential is mainly influenced by emission into water of phosphates and nitrates. Its occurrence can lead to damage to ecosystems, increasing mortality of aquatic fauna and flora and to loss of species that are dependent on low-nutrient environments. In LCA, EP is expressed in mass of P eq.
Formation potential of tropospheric ozone photochemical oxidants, POCP	POCP is the formation of reactive substances (mainly ozone) which are injurious to human health and ecosystems and which also may damage crops. This problem is also indicated with "summer smog". In LCA, POCP is expressed in kg C_2H_4 eq.
Abiotic Depletion Potential, ADP	In LCA, resource depletion is one of the impact categories expressing how much of the world's natural resources (petroleum, iron ore, etc.) are used up. It has global, regional and local aspects of impact and expresses the amount of mineral/ fossil fuel used. In LCA, fossil and non-fossil resource depletion are expressed in terms of the MJ and Sb eq. respectively.

References

ISO 9001:2015/ Quality Management Systems

ISO 50001:2018/ Energy Management Systems

GPI/ General Programme Instructions of the International EPD® System. Version 4.0.

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The International EPD® System/ The International EPD® System is a programme for type III environmental declarations, maintaining a system to verify and register EPD®s as well as keeping a library of EPD®s and PCRs in accordance with ISO 14025. www.environdec.com

Ecoinvent / Ecoinvent Centre, www.ecoinvent.org

SimaPro/ SimaPro LCA Software, Pré Consultants, the Netherlands, www.pre-sustainability.com

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