Environmental Product Declaration

as per ISO 14025 and EN 15804

Owner of the declaration:	Schiedel GmbH & Co. KG
Publisher:	Kiwa-Ecobility Experts
Programme operator:	Kiwa-Ecobility Experts
Registration number:	EPD-Schiedel-286-EN
Issue date:	03.08.2023
Valid to:	03.08.2028

Schiedel SIH Parat

Three-layers insulated chimney as a floor-to-ceiling prefabricated element

1. General information

Schiedel GmbH & Co. KG

Programme operator
Kiwa-Ecobility Experts
Voltastr. 5
13355 Berlin
Germany

Registration number
EPD-SCHIEDEL-286-EN

This declaration is based on the Product Category Rules
PCR B – Product Category Rules for system chimneys (draft)

Issue date
03.08.2023

Valid to
03.08.2028

Frank Huppertz
(Head of Kiwa-Ecobility Experts)

Prof. Dr. Frank Heimbecher
(Chairman of the independent expert committee – Kiwa-Ecobility Experts)

Schiedel SIH Parat

Owner of the declaration
Schiedel GmbH & Co. KG
Lerchenstraße 9
80995 München
Germany

Declared product / declared unit
1 kg chimney system

Scope
Schiedel SIH Parat is a product of the SIH chimney product series. The producer and distributor is Schiedel GmbH & Co. KG, based in Munich (Germany). The EPD refers to the specific product SIH Parat single duct without ventilation/installation.
EPD type: Cradle to gate with modules C1-C4 and module D.
Kiwa-Ecobility Experts shall not be liable with respect to manufacturer information, life cycle assessment data and evidence.

Verification
The European standard EN15804:2012+A2:2019 serves as the core PCR.

Independent verification of the declaration and data according to ISO 14025:2006

☐internal ☒external

Elisabet Amat - Greenize Projects S.L.U.
(Third party verifier)

2. Product

2.1 Product description

Schiedel SIH Parat consists of three system components: fireclay inner tube, mineral wool insulation and a lightweight concrete outer wall element. It is available as a single or double duct and with or without ventilation/installation. Each variant is available with different diameters of the exhaust pipe(s). It is suitable for both, gaseous and liquid fuels. The products are resistant to installation damage and chemical and biological long-term degradation. Within this EPD SIH Parat single duct without ventilation/installation based on 4,7 m chimney length and 18 cm diameter was examined.

2.2 Application

Schiedel SIH Parat is intended for domestic use as an exhaust system. Prefabricated chimney parts are mainly installed in new buildings and connected to an oven. Installation shall be carried out in accordance with the instructions provided by the manufacturer.

2.3 Technical data

Name	Unit	Value (dry operation)	Value (wet operation)
9.2.2 Gas tightness		N1	N1
13 Flow resistance (average roughness)	m	0.0015	0.0015
14 Thermal resistance	m^2K/W	0.00463	0.00463
9.2.1 Fire resistance (soot fire resistance)		Yes (G)	No (O)
8 Compressive strenght (straight inner tubes	MN/m^2	10	10
8 Maximum overall height	m^3	≤ 42	≤ 42
8 Compressive strength (opening sections)	m	> 12.5 ≤ 25 at least 50 kN	> 12.5 ≤ 25 at least 50 kN
10.1 Durability against acid/corrosion resistance		≤ 5 %	≤ 2 %
10.2 Durability against freeze/thaw-change resistance		Constant	Constant
12 Durability against abrasion	kg/m^2	≤ 0.03	≤ 0.03
13 Durability against condensate resistance		N/A	WC
ZA.1 Hazardous substances		None	None

2.4 Placing on the market/ Application rules

For quality assurance, the Schiedel SIH Parat chimneys are regulated in accordance with European harmonised standards (EN 1457-1:2012, EN 1457-2:2012) and marked with a CE mark by the manufacturer. In the EU/EFTA (excluding Switzerland) the placing of exhaust systems on the market is covered by Regulation (EU) No. 305/2011 of 9 March 2011. For the product use the respective national provisions shall apply. In Germany, the ceramic chimney systems are approved for construction by the DIBt (Deutsches Institut für Bautechnik) under the number Z-7.4-3531. The product is distributed in Central Europe with a focus on Germany, Austria and the Czech Republic.

2.5 Base materials / Ancillary materials

Schiedel SIH Parat consists mainly of sand and clay, expanded clay. Raw material composition based on 1 kg of the product is presented in the table below. All raw materials with less than 5% are cut-off in the table overview.

Raw material	Unit	Value
Cement	%	8.65
Clay	%	21.73
Expanded Clay	%	17.30
Fireclay	%	12.91
Mortar	%	6.68
Silica sand	%	25.95

There is no biogenic carbon in the products.
The product does not contain substances from the “Candidate list of substances of very high concern for authorisation” (SVHC).

2.6 Manufacturing

The manufacturing takes place at two different production locations. Outer wall elements production and assembly are caried out at the production location at Schiedel GmbH & Co. KG, Am Wachhübel 2, 04668 Grimma, whereas the ceramic pipe is produced at Schiedel GmbH & Co. KG, Hauptstraße 66, 95676 Wiesau.

The Schiedel SIH Parat consists of the outer wall element, ceramic pipe and insulation. At first, outer wall element is produced via mixing of relevant raw materials with subsequent hardening. Manufactured outer wall elements are then transported to Grimma for assembly.

Clay and fireclay for the ceramic pipe are first milled, then mixed and pressed into a pipe shape. Subsequently, the pipes are dried and burned. The production of the clay pipe is situated in Wiesau.

Eventually, the product is insulated and assembled in Grimma.

The manufacturing process is shown in the following figures below:

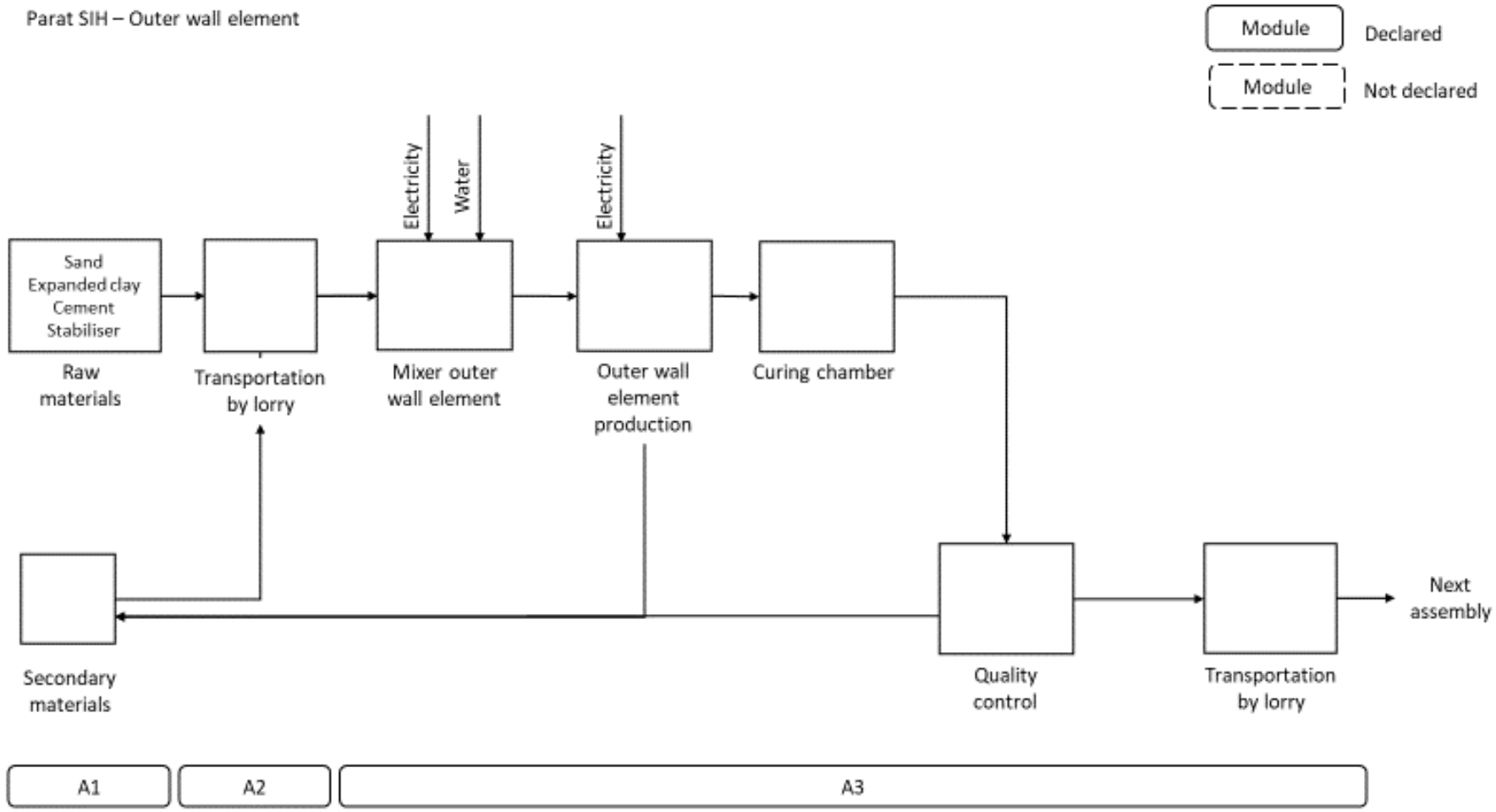

Figure 1: Process flow chart of the production of the outer wall element for Schiedel SIH Parat

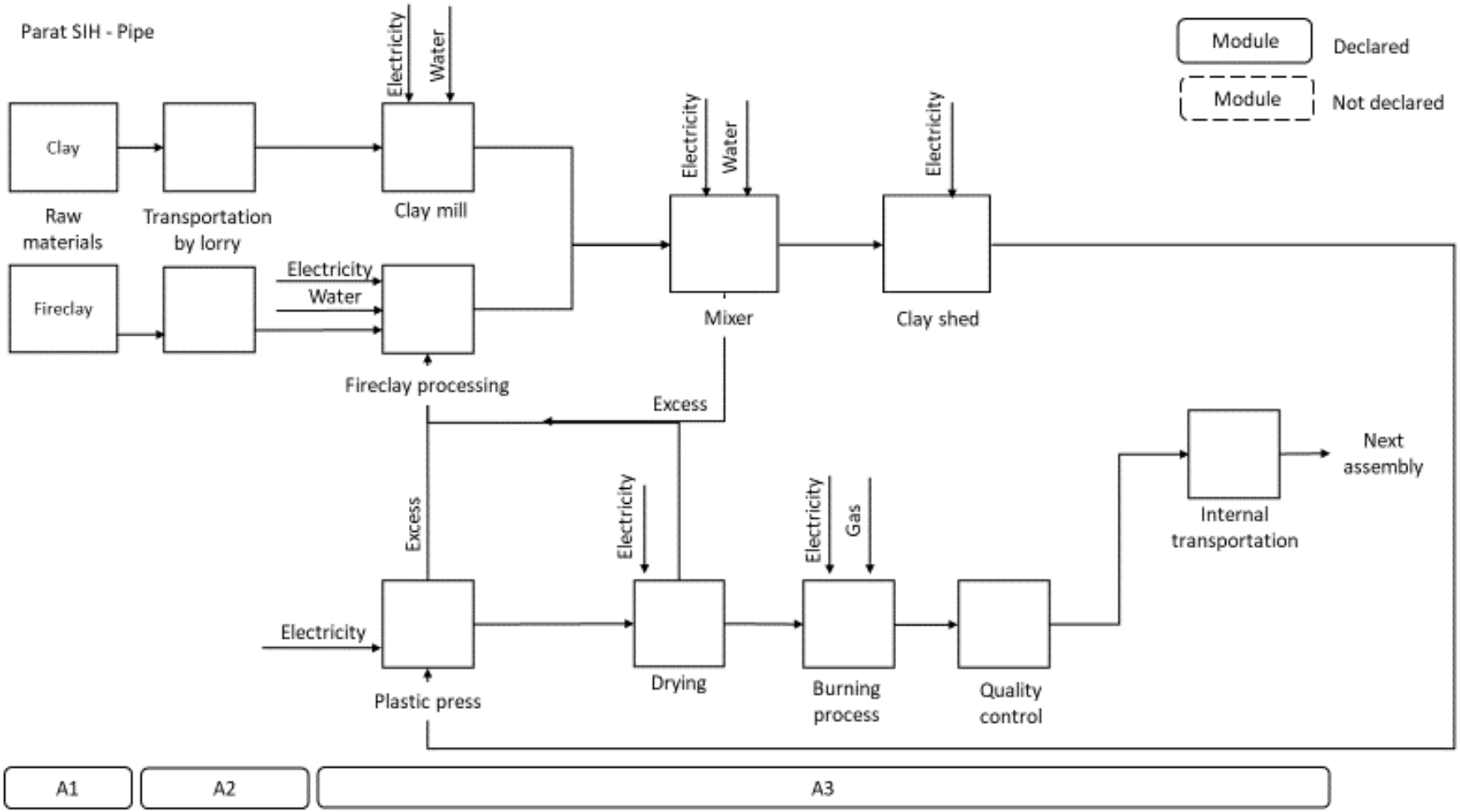

Figure 2: Process flow chart of the production of ceramic pipes Schiedel SIH Parat

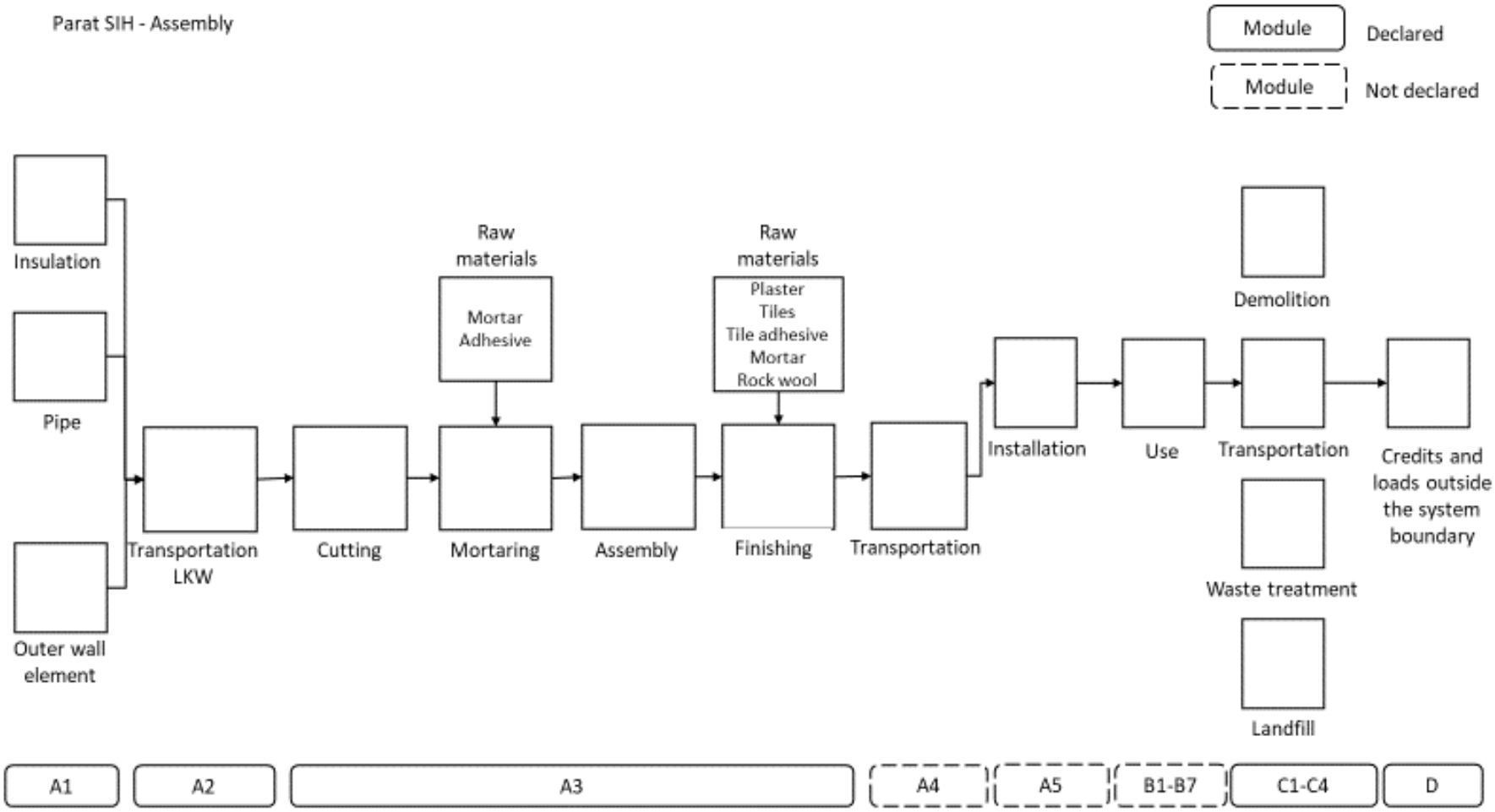

Figure 3: Process flow chart of the assembly of the Schiedel SIH Parat

2.7 Packaging

Schiedel SIH Parat is packed with conventional packaging material (PE foil, cardboard) and it is transported on pallets to the customer.

2.8 Reference Service Life (RSL)

Operational warranty of 30 years is specified by the manufacturer.

2.9 Other Information

For further information on Schiedel products please visit the official webpage under the following link: www.schiedel.com

3. LCA: Calculation rules

3.1 Declared unit

According to the PCR B document for system chimneys, the declared unit is 1 m of the specific chimney. However, based on the chimney length of 4,7 m and 18 cm diameter and the mass the outputs and inputs have been calculated for 1 kg of the chimney. This enables end-users to apply the corresponding results to different chimney lengths and diameters within the same product type.

Product	Unit	Value
Declared Unit	kg	1
Conversion factor to 1 m	m	0.00812

3.2 System boundary

The Environmental Product Declaration encompassed the information modules A1 – A3, and C1 - C4 and D (EPD type: cradle to gate with modules C1-C4 and module D).

The manufacturing phase includes the production or extraction of the source materials, the transport to the respective production plant and the production of the chimney system parts. All inputs (raw materials, precursors, energy, and ancillary materials) as well as the waste are considered for all considered life cycle phases. Finally, only production-related energy consumption (excluding administration and social rooms) is considered.

The year 2021 represents the time reference for raw materials and electricity consumption. Due to manufacturing locations, the exact geographical reference area is Germany, but the present EPD can also be considered representative for the reference area Europe. Environmental effects such as the greenhouse effect can occur with a strong spatial and temporal offset.

The following production steps are considered during the manufacturing phase:

- Raw material supply (to produce outer wall element, ceramic pipe, as well as for assembly)
- Raw material transport to the production site
- Production of mantel stone, ceramic pipe and assembly (e.g., milling, mixing, pressing, drying)
- Use of ancillary materials
- End-of-life (including transport)

Secondary fuels are not included in the production process and are therefore not considered. The waste materials and quantities produced are included in the respective modules.

3.3 Estimates and assumptions

The most datasets chosen for the LCA refer to Germany as the geographic reference. If this was not available, datasets from EU or Switzerland were chosen. Transport distances for all raw materials used could be recorded. A payload factor of 50 percent was used for all truck transports (suppliers, disposal transports and internal transports), which corresponds to a full delivery and empty return trip. A data set for a non-specific truck was used.

Electricity mix was modeled according to the information provided by the company. For some raw materials, no specific datasets were available the EcoInvent database, and alternatives were chosen.

3.4 Cut-off criteria

It has been considered that packaging and ancillary materials have a minor impact on the environment compared to the other parts of the chimney system. Therefore, packaging, and ancillary mate-rials have been put under cut-off. All other flows which influence is higher than 1% on the total mass, energy or environmental impact are included in the LCA. It can be assumed that the neglected processes would have contributed less than 5% to the impact categories considered.

3.5 Period under review

The production data have been collected for the operating year 2021.

3.6 Data quality

For all processes primary data was collected and provided by Schiedel GmbH & Co. KG. The primary data refers to year 2021. For the data, which is not influenced by the manufacturer, generic data was used. The secondary data was taken from the database EcoInvent (version 3.6). The database is maintained on a regular basis and thus meets the requirements of EN 15804 (background data not older than 10 years). The power sources were chosen from data for the Germany in 2021, in accordance with the geographical and time representativeness. The data quality is very good, because all process specific data could be documented and modelled by using the generic data.

RTHiNK EPD web application (R<THiNK 2023) from the company NIBE was used to model the life cycle for the pro-duction and disposal of the declared product systems. To ensure that the results are comparable, consistent background data from the international database EcoInvent was used in the LCA (e.g. data records on energy, transport, auxiliary materials, and supplies). Almost all consistent data sets contained in the EcoInvent database are documented and can be viewed online.

3.7 Allocation

Allocations were avoided as far as possible. There are no coproducts or byproduct in the manufacturing of the Schidel SIH Parat. Based on energy consumption measurements, the energy use of production were allocated to the individual products and processes.

3.8 Comparability

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

4. LCA: Scenarios and additional technical information

For demolition (module C1) a general dataset on machine operation was chosen, which according to EcoInvent represents an average for different construction site machines and/or processes such as cranes, rammers or crushing. It has been assumed that for the demolition of a chimney of a standard length one hour is needed.

For the end-of-life it has been assumed that the product is 100% landfilled.

Note: The transport distances of the waste are based on the standard waste scenarios of the NMD Determination Method (NMD 2019): incineration 150 km/ recycling 50 km / landfill 100 km; vehicle: truck, unspecific.

For all transports, the environmental profile of a non-specific truck transport was used (conservative assumption): The vehicle operates with diesel, and it provides a fleet average that includes different lorry classes as well as EURO classes. This environmental profile contains data for transport, which is calculated for an average load factor, including empty return trips (EcoInvent 3.6).

5. LCA: Results

The following tables show the results of the impact assessment indicators, resource use, waste and other output streams. The results presented here refer to the declared specific product.

Disclaimer on ADP-e, ADP-f, WDP, ETP-fw, HTP-c, HTP-nc, SQP: The results of these environmental impact indicators must be used with caution, as the uncertainties in these results are high or as there is limited experience with the indicator.

Disclaimer on IR: This impact category mainly addresses the potential effect of low dose ionizing radiation on human health in the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents and occupational exposures, nor does it consider radioactive waste disposal in underground facilities. Potential ionizing radiation from soil, radon, and some building materials is also not measured by this indicator.

Description of the system boundary

Product stage			Construction process stage		Use stage							End of life stage				Benefits and loads beyond the system boundaries
Raw material supply	Transport	Manu-facturing	Transport from manu-facturer to place of use	Construction -installation process	Use	Main-tenance	Repair	Replacement	Refur-bishmen	Operational energy use	Operational water use	De-construction / demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
A1	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	X

X=Module declared | MND=Module not declared

Results of the LCA – Environmental impact: 1 kg Schiedel SIH Parat

Parameter	Unit	A1	A2	A3	C1	C2	C3	C4	D
Core environmental impact indicators (EN 15804+A2)									
ADP-mm	kg Sb-eqv.	1,34E-05	6,15E-07	6,54E-07	5,24E-08	3,41E-07	0,00E+00	4,81E-08	2,69E-07
ADP-f	MJ	3,38E+00	3,66E-01	9,56E-01	4,70E-01	2,03E-01	0,00E+00	1,47E-01	2,25E-01
AP	mol H^+ eqv.	1,65E-03	1,41E-04	1,80E-04	1,74E-04	7,81E-05	0,00E+00	4,99E-05	6,59E-05
EP-fw	kg PO_4 eqv.	8,12E-06	2,45E-07	4,71E-06	1,24E-07	1,36E-07	0,00E+00	5,89E-08	3,23E-07
EP-m	kg N eqv.	3,04E-04	4,96E-05	3,66E-05	6,69E-05	2,75E-05	0,00E+00	1,72E-05	1,88E-05
EP-t	mol N eqv.	3,85E-03	5,47E-04	4,92E-04	7,37E-04	3,04E-04	0,00E+00	1,89E-04	2,17E-04
GWP-b	kg CO_2 eqv.	2,33E-03	1,12E-05	2,18E-03	9,50E-06	6,22E-06	0,00E+00	1,04E-05	1,29E-04
GWP-f	kg CO_2 eqv.	4,02E-01	2,43E-02	6,87E-02	3,44E-02	1,35E-02	0,00E+00	5,26E-03	2,76E-02
GWP-luluc	kg CO_2 eqv.	1,09E-04	8,90E-06	4,10E-05	2,69E-06	4,94E-06	0,00E+00	1,47E-06	6,53E-06
GWP-total	kg CO_2 eqv.	4,04E-01	2,43E-02	7,10E-02	3,45E-02	1,35E-02	0,00E+00	5,27E-03	2,77E-02
ODP	kg CFC 11 eqv.	2,64E-08	5,36E-09	5,59E-09	7,38E-09	2,97E-09	0,00E+00	2,16E-09	2,00E-09
POCP	kg NMVOC eqv.	1,08E-03	1,56E-04	1,18E-04	2,08E-04	8,67E-05	0,00E+00	5,50E-05	6,15E-05
WDP	m^3 world eqv.	4,66E-02	1,31E-03	9,38E-03	6,30E-04	7,27E-04	0,00E+00	6,59E-03	1,07E-03
Additional environmental impact indicators (EN 15804+A2)									
ETP-fw	CTUe	8,67E+00	3,27E-01	8,09E-01	2,83E-01	1,81E-01	0,00E+00	9,53E-02	6,79E-01
HTP-c	CTUh	6,69E-10	1,06E-11	3,21E-11	3,02E-11	5,88E-12	0,00E+00	2,20E-12	5,13E-11
HTP-nc	CTUh	9,97E-09	3,57E-10	7,00E-10	2,33E-10	1,98E-10	0,00E+00	6,77E-11	9,43E-10
IRP	kBq U235 eqv.	7,97E-03	1,53E-03	2,33E-03	2,01E-03	8,51E-04	0,00E+00	6,03E-04	3,75E-04
PM	disease incidence	5,94E-08	2,19E-09	2,51E-09	2,72E-09	1,21E-09	0,00E+00	9,70E-10	1,72E-09
SQP	-	1,66E+00	3,18E-01	6,29E-01	6,00E-02	1,76E-01	0,00E+00	3,08E-01	3,10E-02

ADP-mm= Abiotic depletion potential for non-fossil resources | **ADP-f**=Abiotic depletion for fossil resources potential | **AP**= Acidification potential, Accumulated Exceedance | **EP-fw** = Eutrophication potential, fraction of nutrients reaching freshwater end compartment | **EP-m**= Eutrophication potential, fraction of nutrients reaching marine end compartment| **EP-T**= Eutrophication potential, Accumulated Exceedance | **GWP-b**=Global Warming Potential biogenic | **GWP-f**=Global Warming Potential fossil fuels | **GWP-luluc**=Global Warming Potential land use and land use change |**GWP-total**=Global Warming Potential total| **ODP**=Depletion potential of the stratospheric ozone layer |**POCP**=Formation potential of tropospheric ozone | **WDP**=Water (user) deprivation potential, deprivation- weighted water consumption | **ETP-fw**=Potential Comparative Toxic Unit for ecosystems | **HTP-c**=Potential Toxic Unit for Humans toxicity, cancer | **HTP-nc**= Potential Toxic Unit for humans, non-cancer | **IRP**=Potential Human exposure efficiency relative to U235, human health | **PM**=Potential incidence of disease due to Particulate Matter emissions | **SQP**=Potential soil quality index

Results of the LCA – Resource and environmental information: 1 kg Schiedel SIH Parat									
Parameter	**Unit**	**A1**	**A2**	**A3**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	2,97E-01	1,02E-02	2,71E-01	2,63E-03	1,51E-03	1,04E-03	2,05E-04	-3,04E-03
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
PERT	MJ	2,97E-01	1,02E-02	2,71E-01	2,63E-03	1,51E-03	1,04E-03	2,05E-04	-3,04E-03
PENRE	MJ	2,34E+00	8,68E-01	1,40E+00	5,16E-01	1,28E-01	1,96E-02	2,70E-02	-4,66E-02
PENRM	MJ	7,02E-03	0,00E+00	7,71E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	2,35E+00	8,68E-01	1,40E+00	5,16E-01	1,28E-01	1,96E-02	2,70E-02	-4,66E-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
RSF	MJ	1,08E-04	0,00E+00	3,25E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NRSF	MJ	2,45E-04	0,00E+00	7,34E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	M3	1,73E-03	9,96E-05	4,68E-04	2,50E-05	1,47E-05	6,13E-06	2,71E-05	-1,18E-03
HWD	Kg	1,09E-04	2,07E-06	4,79E-06	1,32E-06	3,06E-07	3,19E-08	3,80E-08	-8,88E-08
NHWD	Kg	1,56E-02	5,19E-02	1,55E-02	5,75E-04	7,65E-03	2,56E-03	1,73E-01	-4,76E-04
RWD	Kg	7,99E-06	5,37E-06	4,51E-06	3,37E-06	7,92E-07	8,24E-08	1,67E-07	-1,92E-07
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
MFR	Kg	0,00E+00	0,00E+00	9,22E-02	0,00E+00	0,00E+00	8,39E-01	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
EE	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

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

6. LCA: Interpretation

As shown in the figure below, raw material supply (module A1) has the largest impact within all environmental core indicators. Accordingly, around 70% of the total Global Warming Potential (GWP-total) has its origin in the raw material supply, with the highest esmissions coming from the fire clay (around 55%) and followed by cement (around 20%). Manufacturing of the Schiedel SIH Parat (module A3) contributes with app. 10% to the GWP-total. Transports (modules A2 and C2) in general have rather minor impact within all core indicators.

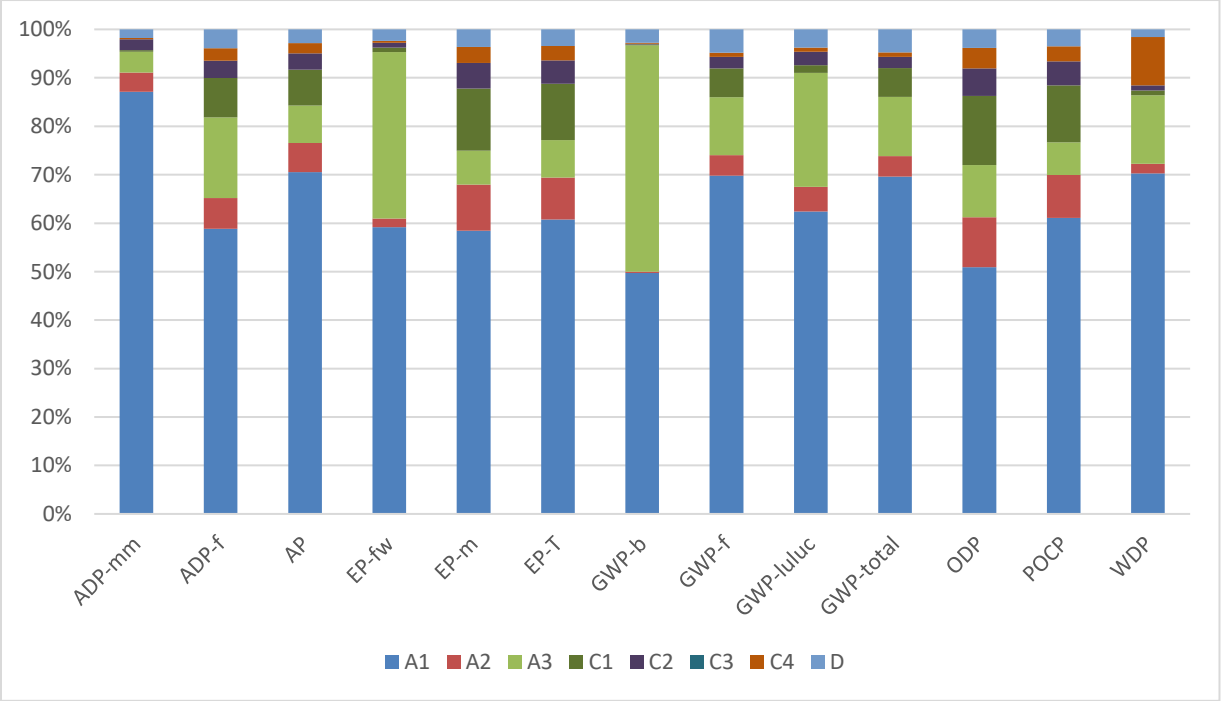

Figure: Schiedel SIH Parat - Impact of the individual modules on the environmental core indicators

The data quality can be classified as good overall. All relevant process specific data could be collected in the operational data collection. Consistent data sets from the EcoInvent database were available for almost all inputs and outputs. The background data meet the requirements of EN 15804, and the production data were recorded for the 2021 operating year. The quantities of raw materials and supplies used as well as energy consumption were recorded for the entire operating year.

7. References

Ecoinvent 2019	Ecoinvent Datenbank Version 3.6 (2019)
EN 15804	EN 15804:2012+A2:2019: Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products
ISO 14025	ISO 14025:2006 Environmental labels and declarations — Type III environmental declarations — Principles and procedures EN 13249
ISO 14040	ISO 14040:2006 Environmental management - Life cycle assessment - Principles and framework
ISO 14044	ISO 14044:2006 Environmental management - Life cycle assessment - Requirements and guidelines
JCR 2014	European Commission Joint Research Centre Institute for Prospective Technological Studies: End-of-waste criteria for waste plastic for conversion, Seville, 2014, doi:10.2791/13033
NMD 2019	NMD STICHTING NATIONAL ENVIRONMENTAL DATABASE: Environmental Performance Assessment Method for Construction; 1.1 (March 2022); Rijswijk
PCR A	Kiwa-Ecobility Experts, Berlin, 2022: PCR A – General Programme Category Rules for Construction Products from the EPD programme of Kiwa-Ecobility Experts; Version 2.1
PCR B	Kiwa-Ecobility Experts “Product Category Rules for system chimneys”, edition 2023-04-09 (draft)
R<THiNK 2023	R<THiNK; Online-EPD-Tool by NIBE B.V.

	Publisher Kiwa-Ecobility Experts Voltastr. 5 13355 Berlin Germany	Mail Web	DE.Ecobility.Experts@kiwa.com https://www.kiwa.com/de/de/themes/ecobility-experts/ecobility-experts/
	Programme operator Kiwa-Ecobility Experts Voltastr. 5 13355 Berlin Germany	Mail Web	DE.Ecobility.Experts@kiwa.com https://www.kiwa.com/de/de/themes/ecobility-experts/ecobility-experts/
	Author of the Life Cycle Assessment Kiwa GmbH Voltastr.5 13355 Berlin Germany	Tel. Fax. Mail Web	+49 (0) 30 467761-43 +49 (0) 30 467761-10 DE.Nachhaltigkeit@kiwa.com https://www.kiwa.com/
	Owner of the declaration Schiedel GmbH & Co. KG Lerchenstraße 9 80995 München Germany	Tel. Fax. Mail Web	+49 89 35 409 0 49 89 35 157 77 info.de@schiedel.com www.schiedel.com/de/

Kiwa-Ecobility Experts - established member of