

# ***ENVIRONMENTAL PRODUCT DECLARATION***

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025 / ISO 21930

## ***INSULATED WALL ELEMENTS***



**We are Framm** – In Norwegian and Swedish, fram means movement, a continuous journey forward. We have come a long way from where we started under the name of Talot in 1990.

There have also been quieter periods in the development of the company, but in the last decade we have moved forward with ever bigger and bolder steps. The last of them – the acquisition of the competing AS Lasbet Tootmine in March 2020 – made us the largest manufacturer of concrete products in Estonia. This gives us the opportunity to turn another old and well-known maker into a modern and up-to-date direction.

Standing still does not fit our essence – we have knowingly invested in the development of our team, products, and manufacturing, and we have reached yet another significant milestone in our journey, where the change must also be projected outward.

#### **GREEN IMPACT**

We strive to take as little as possible from nature and at the same time giving more and more back. It starts with the day-to-day sorting of industrial and municipal waste, the use of materials and energy and the continuous pursuit of other circular economic objectives to reduce our impact on nature.

#### **COMMUNITY**

Our mission is to give a human face to this difficult and technical area and to be actively involved in the concrete field, both at the level of community and in the construction industry.

#### **DEDICATION**

We do our job with great dedication, and we make no allowances when it comes to our work. We always give our best to deliver products and meet customers wishes. We are demanding ourselves and we are continuously improving to offer only the best to our customers.



*“ Standing still does not fit our essence – we have knowingly invested in the development of our team, products, and manufacturing...”*





### **WALL ELEMENTS**

Wall elements can be one-layer and sandwich elements. Sandwich elements comprise a load bearing interior layer (thickness of the layer depends on the loads), exterior layer (usually 70–90 mm) and insulating material (glass or rock wool, polystyrene foam) installed between the two. Wiring ducts for electric, communications, etc. cables may be installed inside the wall elements. Available also two-layer elements for finishing options.



A modern interior space featuring a large, dark concrete wall in the foreground. Behind it, a glass railing overlooks a multi-level atrium. The ceiling is a grid of dark panels with numerous small, recessed lights. The background shows a bright, open space with white walls and a high ceiling, possibly a museum or gallery. The text "INSULATED WALL ELEMENTS" is overlaid in large, bold, white letters.

# ***INSULATED WALL ELEMENTS***

# GENERAL INFORMATION

## MANUFACTURER INFORMATION

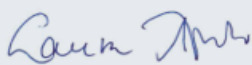
Manufacturer	AS Framm
Address	Vana-Narva mnt 8, Estonia
Contact details	framm@framm.ee
Website	framm.ee
Place(s) of production	Estonia

## The Building Information Foundation RTS sr

EPDs within the same product category but from different programmes may not be comparable.



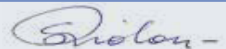
Jukka Seppänen  
RTS EPD Committee Secretary



Laura Apilo  
Managing Director

## EPD INFORMATION

The EPD owner has the sole ownership, liability, and responsibility for the EPD. Construction products EPDs may not be comparable if they do not comply with EN 15804 and if they are not compared in a building context.

EPD program operator	The Building Information Foundation RTS sr
EPD standards	This EPD is in accordance with EN 15804+A2 and ISO 14025 standards.
Product category rules	The CEN standard EN 15804 serves as the core PCR. In addition, the RTS PCR (English version, 26.8.2020 is used.
EPD author	Anette Iital, Mari Kirss Rangi Maja OU www.lcasupport.com
EPD verification	Independent verification of this EPD and data, according to ISO 14025:2010: Internal certification <input type="checkbox"/> External verification <input checked="" type="checkbox"/>
Verification date	10 <sup>th</sup> of March 2023
EPD verifier	Sigita Židonienė  Vesta Consulting UAB www.vestaconsulting.lt
Publication date	07.02.2024
Validity period	07.02.2029
EPD number	RTS_276_24



# PRODUCT INFORMATION

## PRODUCT NAME

Insulated wall elements:

- PF 3-layers;
- PIR 2-layers;
- PIR 3-layer, PF 2-layers;
- EPS 2+3 layers, Rockwool 2+3 layers;
- MW 2+3 layers.

## PRODUCT DESCRIPTION AND APPLICATION

Insulated load-bearing and non-load-bearing precast concrete wall elements that may have external wall and/or facing functions, which are intended to be used in external walls.

## TECHNICAL SPECIFICATIONS

Further information can be found at <https://framm.ee/>

## PHYSICAL PROPERTIES OF THE PRODUCT AND ADDITIONAL TECHNICAL INFORMATION

Product properties and further information can be found on the manufacturer website <https://framm.ee/>

## PRODUCT STANDARDS

EVS-EN 14992:2007+A1:2012 Precast concrete products  
- Wall elements.

## PRODUCT RAW MATERIAL MAIN COMPOSITION

Materials	Amount (%)				
	PF 3-layers	PIR 2-layers	PIR 3-layer, PF 2-layers	EPS 2+3 layers, Rockwool 2+3 layers	MW 2+3 layers
Cement	14.9%	18.4%	16.6%	16.1%	16.5%
Sand	31.7%	35.6%	35.1%	34.0%	34.1%
Limestone	32.5%	22.9%	29.8%	32.0%	26.1%
Granite	10.4%	12.0%	7.6%	5.0%	9.7%
Water	4.4%	4.4%	4.2%	6.4%	6.5%
Additive 1	0.1%	0.1%	0.2%	0.1%	0.2%
Additive 2	-	-	0.2%	0.0%	0.0%
Reinforcing steel	2.7%	1.5%	3.0%	2.6%	2.9%
Reinforcement mesh	2.8%	1.4%	1.9%	2.1%	2.4%
Insulation, PF	0.3%	-	0.1%	-	-
Insulation, PIR	-	2.1%	0.9%	-	-
Insulation, EPS	-	-	-	0.4%	-
Insulation, Mineral wool (Rockwool)	-	-	-	0.9%	-
Insulation, Mineral wool	-	-	-	-	1.2%
Beam	0.2%	1.6%	0.4%	0.4%	0.4%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

## PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass- %					Material origin	Recycled
	PF 3-layers	PIR 2-layers	PIR 3-layer, PF 2-layers	EPS 2+3 layers, Rockwool 2+3 layers	MW 2+3 layers		
Metals	5.6%	2.9%	5.0%	4.6%	5.3%	Europe	92%
Minerals	89.5%	88.8%	89.1%	88.0%	87.6%	Europe	
Water	4.3%	4.4%	4.2%	6.4%	6.5%	Europe	
Fossil materials	0.4%	2.2%	1.3%	0.5%	0.2%	Europe	
Bio-based materials	0.2%	1.7%	0.4%	0.5%	0.4%	Europe	
Total	100.0%	100.0%	100.0%	100.0%	100.0%		

## SUBSTANCES, REACH - VERY HIGH CONCERN

The product does not contain any REACH SVHC substances in amounts greater than 0.1% (1000 ppm).



# PRODUCT LIFE-CYCLE

## MANUFACTURING AND PACKAGING (A1-A3)

Insulated wall elements have been grouped into 5 groups: PF 3-layers; PIR 2-layers; PIR 3-layer, PF 2-layers; EPS 2+3 layers, Rockwool 2+3 layers; MW 2+3 layers. Each group represents an average product, based on the products' recipe and GWP values, which do not differ more than 10%.

Insulated wall elements are produced in two of the factories belonging to the company: Vana-Narva mnt 8 (in Maardu) and Punane tn 18 (in Tallinn). In the factories, several kinds of concrete elements are produced. The allocation is made in accordance with the provisions of EN 15804. Allocation is based on annual production data and rate for 2021. Since the production processes of these products are similar, the annual production percentages are taken into consideration for allocation. According to the ratio of the annual production of the declared products to the total annual production at the factories, the annual total raw materials, energy consumption, packaging materials and the generated waste per the declared product are allocated. Co-product allocation has not been used.

Insulated 3-layer wall elements are typically produced on metal casting tables in various sizes, according to the shop drawings. First, the casting table is cleaned, the mold is assembled and treated with form oil. The reinforcement is assembled and placed into the mold, taking into account the required concrete cover. The concrete mix is poured into the mold and compacted. The insulation and shear reinforcement are installed. The reinforcement of the second layer is placed into the mold, again taking into account the required concrete cover. The second layer concrete is poured into the mold, compacted, troweled and covered, if necessary. The element is left to cure until the necessary lifting strength is achieved. The production process may vary slightly in details, according to the special requirements specified in the shop drawings.

There is no packaging used in case of insulated wall elements.

Electricity used during manufacturing is electricity from the grid and green electricity (wind power from Sweden).

## MANUFACTURING ENERGY SCENARIO DOCUMENTATION

Object	GWP fossil	Data quality
Electricity: data quality and CO2 emission kg CO2 eq. / kWh	0.88 kg-CO2e/kWh	Market for electricity, high voltage (Reference product: electricity, high voltage), Estonia, Ecoinvent 3.8.
Electricity: data quality and CO2 emission kg CO2 eq. / kWh	0.016 kgCO2e/kWh	Electricity production, wind, 1-3MW turbine, onshore (Reference product: electricity, high voltage), Sweden, Ecoinvent 3.8.
Fuels (diesel): data quality and CO2 emission kg CO2 eq. / kWh	0.33 kg-CO2e/kWh	Diesel, burned in building machine (Reference product: diesel, burned in building machine), Global, Ecoinvent 3.8.
Heating fuels: data quality and CO2 emission kg CO2 eq. / kWh	0.12 kg-CO2e/kWh	Heat and power co-generation, diesel, 200kw electrical, scr-nox reduction (Reference product: heat, district or industrial, other than natural gas), Global, Ecoinvent 3.8.
Heating: data quality and CO2 emission kg CO2 eq. / kWh	0.26 kg-CO2e/kWh	Heat production, natural gas, at industrial furnace >100kw (Reference product: heat, district or industrial, natural gas), Global, Ecoinvent 3.8.



### TRANSPORT AND INSTALLATION (A4-A5)

Transportation impacts occurred from final products delivery to construction site (A4) cover fuel direct exhaust emissions, environmental impacts of fuel production, as well as related infrastructure emissions.

The transportation distance is defined according to RTS PCR. Transportation from the manufacturing plants to the building site has been calculated using a most likely scenario – Helsinki (Finland). It is assumed that the distance is 20 km by lorry and 82 km by ferry. The distances are a mean average as the company uses several ports and production takes place in two factories. According to the manufacturer, transportation doesn't cause losses.

There is no packaging used in case of precast concrete elements.

Vehicle capacity utilization volume factor is assumed to be 1.

### TRANSPORT SCENARIO DOCUMENTATION (A4)

Scenario parameter	Value
A4 specific transport CO <sub>2</sub> e emissions, kg CO <sub>2</sub> e / tkm (GWP-fossil)	0.12
A4 average transport distance, km	20+82 (lorry and ferry)
A4 Capacity utilization (including empty return) %	100
A4 mass of transported products (including packaging)	1 t (for all the products)
A4 Volume capacity utilization factor	=1

Optional module A5 is not declared.

### PRODUCT USE AND MAINTENANCE (B1-B7)

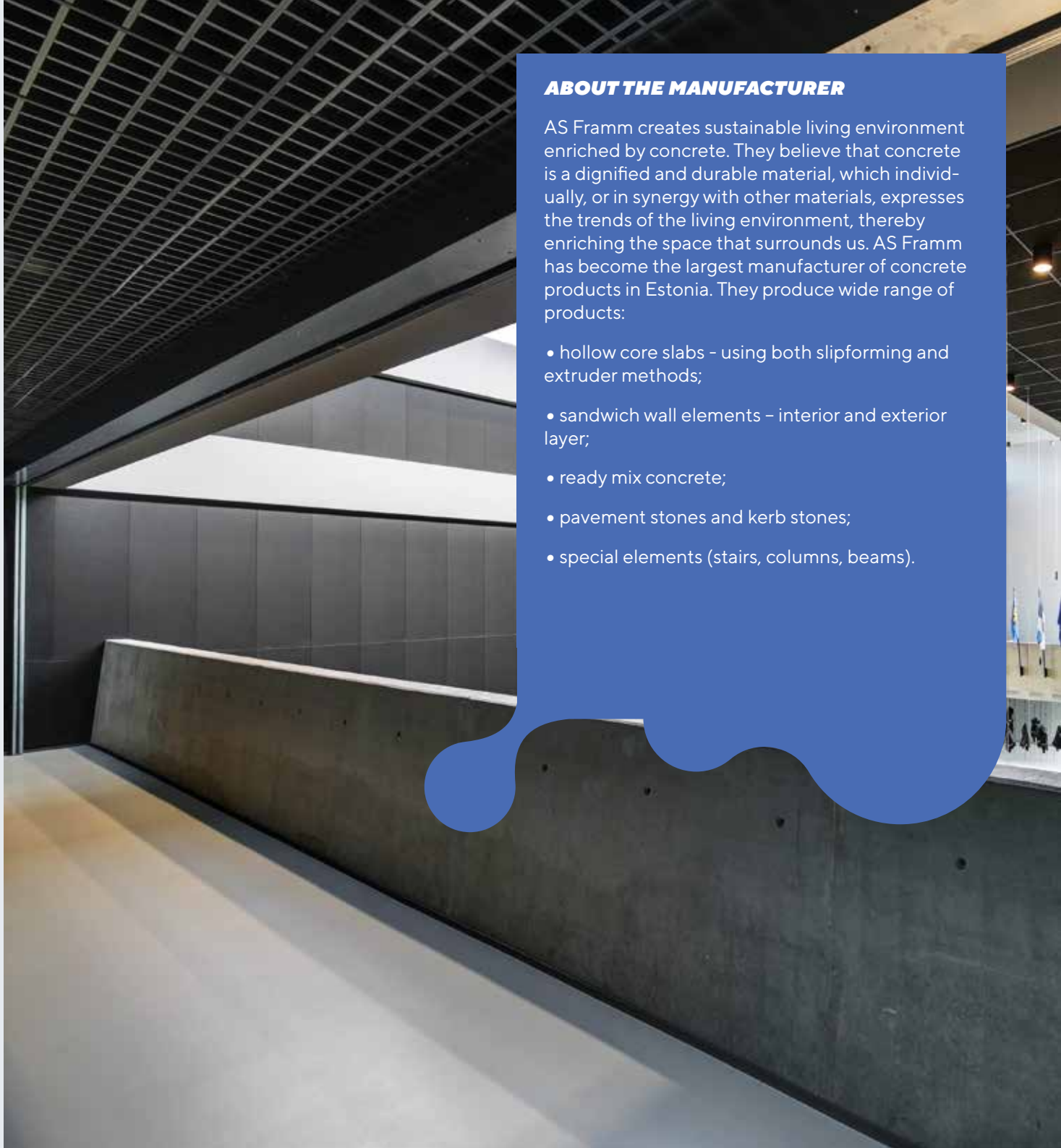
This EPD does not cover the use phase.

Air, soil, and water impacts during the use phase have not been studied.

### ABOUT THE MANUFACTURER

AS Framm creates sustainable living environment enriched by concrete. They believe that concrete is a dignified and durable material, which individually, or in synergy with other materials, expresses the trends of the living environment, thereby enriching the space that surrounds us. AS Framm has become the largest manufacturer of concrete products in Estonia. They produce wide range of products:

- hollow core slabs – using both slipforming and extruder methods;
- sandwich wall elements – interior and exterior layer;
- ready mix concrete;
- pavement stones and kerb stones;
- special elements (stairs, columns, beams).







### PRODUCT END OF LIFE (C1-C4, D)

At the end-of-life, in the demolition phase 100% of the waste is assumed to be collected as separate construction waste (C1). Energy consumption of a demolition process is on the average 10 kWh/m<sup>2</sup> (Bozdağ, Ö & Seçer, M., 2007). Basing on a Level(s) project, an average mass of a reinforced concrete building is about 1000 kg/m<sup>2</sup>. Therefore, energy consumption demolition is 10 kWh/1000 kg = 0,01 kWh/kg. The source of energy is diesel fuel used by work machines.

All of the end-of-life product is assumed to be sent to the closest facilities such as recycling and landfill (C2). Transportation distance to the closest disposal area is estimated as 50 km and the transportation method is lorry which is the most common.

100% of steel and 92% concrete is recycled (C3) and the remaining is sent to local landfill for disposal (C4). Steel will be melted and concrete crushed.

Due to the recycling potential of reinforcement steel and concrete, the end-of-life product is converted into recycled raw materials (D). Steel can be re-used and crushed concrete used as road filling.



### END OF LIFE SCENARIO DOCUMENTATION

Scenario parameter	PF 3-layers	PIR 2-layers	PIR 3-layer, PF 2-layers	EPS 2+3 layers, Rockwool 2+3 layers	MW 2+3 layers
Collection process – kg collected separately	1000.00	1000.00	1000.00	1000.00	1000.00
Collection process – kg collected with mixed waste	0	0	0	0	0
Recovery process – kg for re-use	0	0	0	0	0
Recovery process – kg for recycling	921.48	902.51	914.97	911.91	912.93
Recovery process – kg for energy recovery	0	0	0	0	0
Disposal (total) – kg for final deposition	78.52	97.49	85.03	88.09	87.07
Scenario assumptions e.g. transportation	End-of-life product is transported 50 km with an average lorry				

### LIFE-CYCLE ASSESSMENT INFORMATION

Period for data	2021
Declared unit	1 tonne
Mass per declared unit	1000 kg

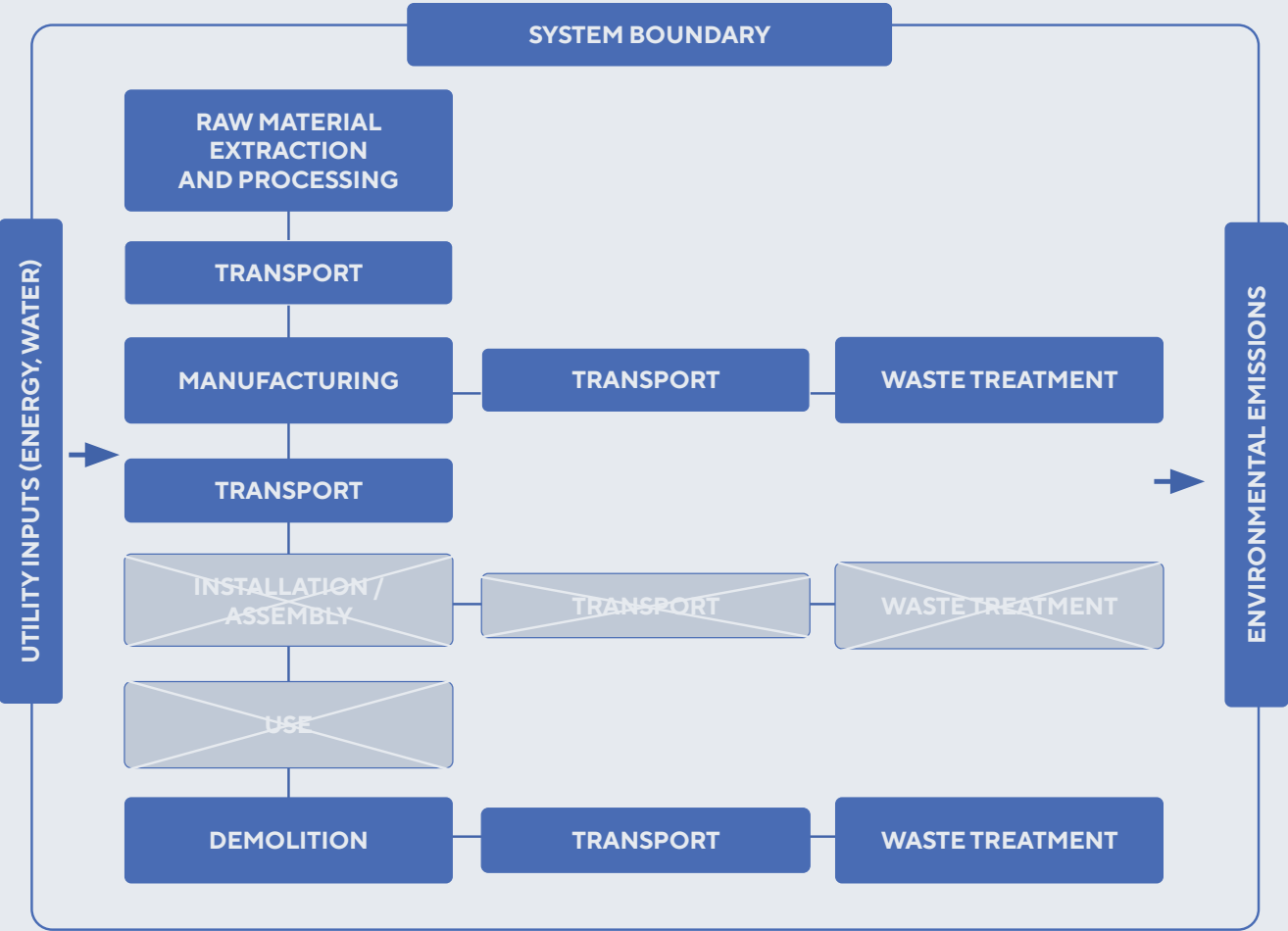
The source of LCA data is Ecoinvent 3.8 or specific EPDs. The tools used were One Click LCA and Open LCA.

**BIOGENIC CARBON CONTENT AT GATE**

Insulated wall elements contain biogenic carbon. As the mass of biogenic carbon containing materials in the product is less than 5% of the mass of the product, the declaration of biogenic carbon content is not omitted. There is no packaging used in case of insulated wall elements.

**SYSTEM BOUNDARY**

The scope of the EPD is cradle to gate with option A4, modules C1–C4 and module D.





Product stage			Assembly stage		Use stage							End of life stage				Beyond the system boundaries		
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	D	D
x	x	x	x		Modules not declared							x	x	x	x	x	x	x
Raw materials	Transport	Manufacturing	Transport	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstr./demol.	Transport	Waste processing	Disposal	Reuse	Recovery	Recycling

CUT-OFF CRITERIA

The study does not exclude any modules or processes which are stated mandatory in the EN 15804:2012+A2:2019 and the applied PCR. The module A5 has not been calculated nor included in the LCA calculations. The study does not exclude any hazardous materials or substances.

The study includes all major raw material and energy consumption. All inputs and outputs of the unit processes, for which data is available for, are included in the calculation. There is no neglected unit process more than 1% of total mass or energy flows. The module specific total neglected input and output flows also do not exceed 5% of energy usage or mass.

Cut-off has not been applied.



# ENVIRONMENTAL IMPACT DATA

## PF 3-LAYERS

### CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2. PEF

Impact category	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
GWP – total	kg CO2e	2.09E+2	4.64E+1	1.18E+1	2.67E+2	1.24E+1	3.30E+0	8.50E+0	6.60E+0	4.30E-1	-1.42E+1
GWP – fossil	kg CO2e	2.09E+2	4.64E+1	1.18E+1	2.67E+2	1.24E+1	3.30E+0	8.50E+0	6.60E+0	4.30E-1	-1.42E+1
GWP – biogenic	kg CO2e	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
GWP – LULUC	kg CO2e	1.38E-1	1.83E-2	4.16E-3	1.60E-1	7.20E-3	3.30E-4	3.25E-3	6.56E-4	4.11E-4	-5.85E-3
Ozone depletion pot.	kg CFC-11e	7.62E-6	1.03E-5	2.09E-6	2.00E-5	2.56E-6	7.10E-7	1.90E-6	1.40E-6	1.68E-7	-7.63E-7
Acidification potential	mol H+e	7.42E-1	2.42E-1	6.28E-2	1.05E+0	3.09E-1	3.40E-2	3.35E-2	6.89E-2	4.05E-3	-7.40E-2
EP-fresh-water	kg Pe	9.86E-3	3.20E-4	1.06E-4	1.03E-2	5.35E-5	1.10E-5	6.00E-5	2.16E-5	4.64E-6	-4.21E-4
EP-marine	kg Ne	2.06E-1	6.89E-2	1.72E-2	2.92E-1	7.78E-2	1.50E-2	1.00E-2	2.97E-2	1.38E-3	-1.02E-2
EP-terrestrial	mol Ne	2.12E+0	7.60E-1	1.86E-1	3.07E+0	8.64E-1	1.70E-1	1.10E-1	3.31E-1	1.54E-2	-2.02E-1
POCP (“smog”)	kg NMVOCe	6.76E-1	2.26E-1	5.42E-2	9.56E-1	2.27E-1	4.60E-2	3.40E-2	9.19E-2	4.45E-3	-7.28E-2
ADP-minerals & metals	kg Sbe	6.57E-4	1.57E-4	1.73E-5	8.31E-4	2.33E-5	1.70E-6	2.95E-5	3.31E-6	1.01E-6	-2.75E-4
ADP-fossil resources	MJ	1.47E+3	6.70E+2	1.86E+2	2.33E+3	1.63E+2	4.45E+1	1.24E+2	8.88E+1	1.16E+1	-1.57E+2
Water use	m3e depr.	7.48E+3	2.94E+0	1.32E+0	7.49E+3	5.32E-1	1.20E-1	5.50E-1	2.43E-1	3.91E-2	-1.08E+1

GWP = Global Warming Potential; EP = Eutrophication potential; POCP = Photochemical ozone formation; ADP = Abiotic depletion potential.  
EN 15804+A2 disclaimer for Abiotic depletion and Water use and optional indicators except Particulate matter and Ionizing radiation. human health. The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.



## USE OF NATURAL RESOURCES

Impact category	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
Renew. PER as energy	MJ	1.76E+2	9.30E+0	2.41E+1	2.10E+2	1.42E+0	2.50E-1	1.75E+0	5.09E-1	1.07E-1	-1.69E+1
Renew. PER as material	MJ	2.55E+1	0.00E+0	2.90E+1	5.45E+1	0.00E+0	0.00E+0	0.00E+0	-2.55E+1	0.00E+0	0.00E+0
Total use of renew. PER	MJ	2.02E+2	9.30E+0	5.31E+1	2.64E+2	1.42E+0	2.50E-1	1.75E+0	-2.50E+1	1.07E-1	-1.69E+1
Non-re. PER as energy	MJ	1.59E+3	6.70E+2	1.25E+2	2.39E+3	1.63E+2	4.45E+1	1.24E+2	8.88E+1	1.16E+1	-1.57E+2
Non-re. PER as material	MJ	1.11E+2	0.00E+0	6.04E+1	1.72E+2	0.00E+0	0.00E+0	0.00E+0	-1.11E+2	0.00E+0	0.00E+0
Total use of non-re. PER	MJ	1.71E+3	6.70E+2	1.86E+2	2.56E+3	1.63E+2	4.45E+1	1.24E+2	-2.24E+1	1.16E+1	-1.57E+2
Secondary materials	kg	4.71E+1	2.27E-1	3.76E-2	4.74E+1	6.33E-2	1.70E-2	4.15E-2	3.45E-2	2.54E-3	5.96E+1
Renew. secondary fuels	MJ	1.26E+2	2.41E-3	1.81E-4	1.26E+2	3.13E-4	5.70E-5	4.55E-4	1.13E-4	7.01E-5	-1.92E-3
Non-ren. secondary fuels	MJ	3.58E+2	0.00E+0	0.00E+0	3.58E+2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Use of net fresh water	m³	1.13E+0	8.25E-2	8.07E-2	1.29E+0	1.29E-2	2.70E-3	1.55E-2	5.41E-3	1.29E-2	-5.06E-1

PER = Primary energy Resources

## END OF LIFE – WASTE

Impact category	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
Hazardous waste	kg	2.67E+1	7.63E-1	1.96E-1	2.77E+1	1.95E-1	6.00E-2	1.40E-1	1.19E-1	0.00E+0	-4.75E+0
Non-hazardous waste	kg	1.65E+2	1.31E+1	3.63E+0	1.82E+2	2.13E+0	4.20E-1	2.45E+0	8.37E-1	7.85E+1	-2.92E+1
Radioactive waste	kg	3.66E-3	4.62E-3	6.83E-4	8.96E-3	1.14E-3	3.10E-4	8.50E-4	6.28E-4	0.00E+0	-4.55E-4





## END OF LIFE – OUTPUT FLOWS

Impact category	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
Components for re-use	kg	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Materials for recycling	kg	2.37E-2	0.00E+0	0.00E+0	2.37E-2	0.00E+0	0.00E+0	0.00E+0	9.21E+2	0.00E+0	0.00E+0
Materials for energy rec	kg	3.47E-2	0.00E+0	0.00E+0	3.47E-2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Exported energy	MJ	2.46E-2	0.00E+0	0.00E+0	2.46E-2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0

## KEY INFORMATION TABLE (RTS) – KEY INFORMATION PER KG OF PRODUCT

Impact category	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
GWP – total	kg CO <sub>2</sub> e	2.09E-1	4.64E-2	1.18E-2	2.67E-1	1.24E-2	3.30E-3	8.50E-3	6.60E-3	4.30E-4	-1.42E-2
ADP-minerals & metals	kg Sbe	6.57E-7	1.57E-7	1.73E-8	8.31E-7	2.33E-8	1.70E-9	2.95E-8	3.31E-9	1.01E-9	-2.75E-7
ADP-fossil	MJ	1.47E+0	6.70E-1	1.86E-1	2.33E+0	1.63E-1	4.45E-2	1.24E-1	8.88E-2	1.16E-2	-1.57E-1
Water use	m <sup>3</sup> e depr.	7.48E+0	2.94E-3	1.32E-3	7.49E+0	5.32E-4	1.20E-4	5.50E-4	2.43E-4	3.91E-5	-1.08E-2
Secondary materials	kg	4.71E-2	2.27E-4	3.76E-5	4.74E-2	6.33E-5	1.70E-5	4.15E-5	3.45E-5	2.54E-6	5.96E-2
Biog. C in product	kg C	N/A	N/A	ND	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Biog. C in packaging	kg C	N/A	N/A	0.00E+0	N/A	N/A	N/A	N/A	N/A	N/A	N/A

## ENVIRONMENTAL IMPACTS – EN 15804+A1. CML / ISO 21930

Impact category	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
Global Warming Pot.	kg CO <sub>2</sub> e	2.08E+2	4.38E+1	1.15E+1	2.63E+2	1.22E+1	3.30E+0	8.00E+0	6.53E+0	4.21E-1	-1.34E+1
Ozone depletion Pot.	kg CFC-11e	6.72E-6	8.15E-6	1.76E-6	1.66E-5	1.99E-6	5.60E-7	1.50E-6	1.12E-6	1.36E-7	-7.59E-7
Acidification	kg SO <sub>2</sub> e	4.41E-1	1.90E-1	5.03E-2	6.81E-1	2.48E-1	2.50E-2	2.60E-2	4.93E-2	3.00E-3	-5.82E-2
Eutrophication	kg PO <sub>4</sub> 3e	4.04E-1	3.73E-2	9.82E-3	4.51E-1	2.86E-2	5.70E-3	6.00E-3	1.13E-2	6.79E-4	-2.67E-2
POCP (“smog”)	kg C <sub>2</sub> H <sub>4</sub> e	6.73E-2	6.84E-3	2.05E-3	7.62E-2	6.41E-3	5.40E-4	1.05E-3	1.07E-3	1.29E-4	-7.70E-3
ADP-elements	kg Sbe	6.59E-4	1.54E-4	1.71E-5	8.30E-4	2.23E-5	1.70E-6	2.90E-5	3.31E-6	1.01E-6	-2.75E-4
ADP-fossil	MJ	1.68E+3	6.70E+2	1.85E+2	2.53E+3	1.63E+2	4.45E+1	1.24E+2	8.88E+1	1.16E+1	-1.57E+2



# PIR 2-LAYERS

## CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2. PEF

Impact category	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
GWP – total	kg CO2e	2.52E+2	3.84E+1	1.18E+1	3.02E+2	1.24E+1	3.30E+0	8.50E+0	5.16E+0	6.27E-1	-9.33E+0
GWP – fossil	kg CO2e	2.52E+2	3.84E+1	1.18E+1	3.02E+2	1.24E+1	3.30E+0	8.50E+0	5.16E+0	6.27E-1	-9.32E+0
GWP – biogenic	kg CO2e	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
GWP – LULUC	kg CO2e	1.79E-1	1.53E-2	4.16E-3	1.98E-1	7.20E-3	3.30E-4	3.25E-3	5.13E-4	6.16E-4	-8.63E-3
Ozone depletion pot.	kg CFC-11e	1.13E-4	8.53E-6	2.09E-6	1.24E-4	2.56E-6	7.10E-7	1.90E-6	1.10E-6	2.28E-7	-6.35E-7
Acidification potential	mol H+e	8.23E-1	2.21E-1	6.28E-2	1.11E+0	3.09E-1	3.40E-2	3.35E-2	5.39E-2	5.71E-3	-5.49E-2
EP-fresh-water	kg Pe	1.24E-2	2.62E-4	1.06E-4	1.28E-2	5.35E-5	1.10E-5	6.00E-5	1.68E-5	7.62E-6	-4.09E-4
EP-marine	kg Ne	2.10E-1	6.22E-2	1.72E-2	2.90E-1	7.78E-2	1.50E-2	1.00E-2	2.32E-2	1.94E-3	-9.68E-3
EP-terrestrial	mol Ne	2.46E+0	6.87E-1	1.86E-1	3.33E+0	8.64E-1	1.70E-1	1.10E-1	2.58E-1	2.15E-2	-1.53E-1
POCP (“smog”)	kg NMVOCe	7.72E-1	2.01E-1	5.42E-2	1.03E+0	2.27E-1	4.60E-2	3.40E-2	7.19E-2	6.24E-3	-4.55E-2
ADP-minerals & metals	kg Sbe	3.90E-4	1.28E-4	1.73E-5	5.35E-4	2.33E-5	1.70E-6	2.95E-5	2.58E-6	1.66E-6	-1.35E-4
ADP-fossil resources	MJ	8.29E+2	5.53E+2	1.86E+2	1.57E+3	1.63E+2	4.45E+1	1.24E+2	6.94E+1	1.62E+1	-1.19E+2
Water use	m3e depr.	8.70E+3	2.41E+0	1.32E+0	8.70E+3	5.32E-1	1.20E-1	5.50E-1	1.91E-1	6.55E-2	-1.26E+1

GWP = Global Warming Potential; EP = Eutrophication potential; POCP = Photochemical ozone formation; ADP = Abiotic depletion potential.  
EN 15804+A2 disclaimer for Abiotic depletion and Water use and optional indicators except Particulate matter and Ionizing radiation. human health. The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.





## USE OF NATURAL RESOURCES

Impact category	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
Renew. PER as energy	MJ	5.19E+2	7.60E+0	2.41E+1	5.51E+2	1.42E+0	2.50E-1	1.75E+0	3.98E-1	1.86E-1	-1.16E+1
Renew. PER as material	MJ	2.40E+2	0.00E+0	2.90E+1	2.69E+2	0.00E+0	0.00E+0	0.00E+0	-2.40E+2	0.00E+0	0.00E+0
Total use of renew. PER	MJ	7.59E+2	7.60E+0	5.31E+1	8.20E+2	1.42E+0	2.50E-1	1.75E+0	-2.40E+2	1.86E-1	-1.16E+1
Non-re. PER as energy	MJ	2.57E+3	5.53E+2	1.25E+2	3.25E+3	1.63E+2	4.45E+1	1.24E+2	6.94E+1	1.62E+1	-1.19E+2
Non-re. PER as material	MJ	3.49E+2	0.00E+0	6.04E+1	4.10E+2	0.00E+0	0.00E+0	0.00E+0	-3.49E+2	0.00E+0	0.00E+0
Total use of non-re. PER	MJ	2.92E+3	5.53E+2	1.86E+2	3.66E+3	1.63E+2	4.45E+1	1.24E+2	-2.80E+2	1.62E+1	-1.19E+2
Secondary materials	kg	3.46E+1	1.88E-1	3.76E-2	3.48E+1	6.33E-2	1.70E-2	4.15E-2	2.70E-2	4.17E-3	3.09E+1
Renew. secondary fuels	MJ	1.76E+2	1.96E-3	1.81E-4	1.76E+2	3.13E-4	5.70E-5	4.55E-4	8.87E-5	1.33E-4	-1.16E-3
Non-ren. secondary fuels	MJ	4.59E+2	0.00E+0	0.00E+0	4.59E+2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Use of net fresh water	m <sup>3</sup>	2.94E+2	6.74E-2	8.07E-2	2.94E+2	1.29E-2	2.70E-3	1.55E-2	4.23E-3	1.77E-2	-3.80E-1

PER = Primary energy resources

## END OF LIFE - WASTE

Impact category	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
Hazardous waste	kg	1.81E+1	6.30E-1	1.96E-1	1.89E+1	1.95E-1	6.00E-2	1.40E-1	9.27E-2	0.00E+0	-1.92E+0
Non-hazardous waste	kg	1.34E+2	1.07E+1	3.63E+0	1.48E+2	2.13E+0	4.20E-1	2.45E+0	6.54E-1	9.75E+1	-2.13E+1
Radioactive waste	kg	1.08E-2	3.81E-3	6.83E-4	1.53E-2	1.14E-3	3.10E-4	8.50E-4	4.90E-4	0.00E+0	-4.89E-4



## END OF LIFE – OUTPUT FLOWS

Impact category	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
Components for re-use	kg	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Materials for recycling	kg	3.27E-2	0.00E+0	0.00E+0	3.27E-2	0.00E+0	0.00E+0	0.00E+0	9.03E+2	0.00E+0	0.00E+0
Materials for energy rec	kg	4.05E-2	0.00E+0	0.00E+0	4.05E-2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Exported energy	MJ	2.87E-2	0.00E+0	0.00E+0	2.87E-2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0

## KEY INFORMATION TABLE (RTS) – KEY INFORMATION PER KG OF PRODUCT

Impact category	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
GWP – total	kg CO2e	2.52E-1	3.84E-2	1.18E-2	3.02E-1	1.24E-2	3.30E-3	8.50E-3	5.16E-3	6.27E-4	-9.33E-3
ADP-minerals & metals	kg Sbe	3.90E-7	1.28E-7	1.73E-8	5.35E-7	2.33E-8	1.70E-9	2.95E-8	2.58E-9	1.66E-9	-1.35E-7
ADP-fossil	MJ	8.29E-1	5.53E-1	1.86E-1	1.57E+0	1.63E-1	4.45E-2	1.24E-1	6.94E-2	1.62E-2	-1.19E-1
Water use	m3e depr.	8.70E+0	2.41E-3	1.32E-3	8.70E+0	5.32E-4	1.20E-4	5.50E-4	1.91E-4	6.55E-5	-1.26E-2
Secondary materials	kg	3.46E-2	1.88E-4	3.76E-5	3.48E-2	6.33E-5	1.70E-5	4.15E-5	2.70E-5	4.17E-6	3.09E-2
Biog. C in product	kg C	N/A	N/A	ND	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Biog. C in packaging	kg C	N/A	N/A	0.00E+0	N/A	N/A	N/A	N/A	N/A	N/A	N/A

## ENVIRONMENTAL IMPACTS – EN 15804+A1. CML / ISO 21930

Impact category	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
Global Warming Pot.	kg CO2e	2.63E+2	3.63E+1	1.15E+1	3.10E+2	1.22E+1	3.30E+0	8.00E+0	5.10E+0	6.14E-1	-8.98E+0
Ozone depletion Pot.	kg CFC-11e	7.57E-6	6.73E-6	1.76E-6	1.61E-5	1.99E-6	5.60E-7	1.50E-6	8.72E-7	1.83E-7	-5.69E-7
Acidification	kg SO2e	5.05E-1	1.74E-1	5.03E-2	7.29E-1	2.48E-1	2.50E-2	2.60E-2	3.85E-2	4.25E-3	-4.29E-2
Eutrophication	kg PO43e	3.52E-1	3.25E-2	9.82E-3	3.95E-1	2.86E-2	5.70E-3	6.00E-3	8.87E-3	1.09E-3	-1.98E-2
POCP (“smog”)	kg C2H4e	8.53E-2	6.06E-3	2.05E-3	9.34E-2	6.41E-3	5.40E-4	1.05E-3	8.35E-4	1.80E-4	-4.10E-3
ADP-elements	kg Sbe	7.29E-3	1.26E-4	1.71E-5	7.43E-3	2.23E-5	1.70E-6	2.90E-5	2.58E-6	1.64E-6	-1.34E-4
ADP-fossil	MJ	2.82E+3	5.53E+2	1.85E+2	3.56E+3	1.63E+2	4.45E+1	1.24E+2	6.94E+1	1.62E+1	-1.19E+2



# PIR 3-LAYER. PF 2-LAYERS

## CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2. PEF

Impact category	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
GWP – total	kg CO2e	2.38E+2	4.59E+1	1.18E+1	2.96E+2	1.24E+1	3.30E+0	8.50E+0	6.28E+0	5.00E-1	-1.06E+1
GWP – fossil	kg CO2e	2.38E+2	4.59E+1	1.18E+1	2.96E+2	1.24E+1	3.30E+0	8.50E+0	6.28E+0	4.99E-1	-1.06E+1
GWP – biogenic	kg CO2e	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
GWP – LULUC	kg CO2e	1.65E-1	1.80E-2	4.16E-3	1.88E-1	7.20E-3	3.30E-4	3.25E-3	6.24E-4	4.83E-4	-7.80E-3
Ozone depletion pot.	kg CFC-11e	5.19E-5	1.02E-5	2.09E-6	6.42E-5	2.56E-6	7.10E-7	1.90E-6	1.33E-6	1.89E-7	-6.66E-7
Acidification potential	mol H+e	8.28E-1	2.25E-1	6.28E-2	1.12E+0	3.09E-1	3.40E-2	3.35E-2	6.56E-2	4.63E-3	-5.99E-2
EP-fresh-water	kg Pe	1.21E-2	3.18E-4	1.06E-4	1.26E-2	5.35E-5	1.10E-5	6.00E-5	2.05E-5	5.70E-6	-4.10E-4
EP-marine	kg Ne	2.17E-1	6.46E-2	1.72E-2	2.99E-1	7.78E-2	1.50E-2	1.00E-2	2.82E-2	1.57E-3	-9.76E-3
EP-terrestrial	mol Ne	2.35E+0	7.12E-1	1.86E-1	3.25E+0	8.64E-1	1.70E-1	1.10E-1	3.14E-1	1.75E-2	-1.65E-1
POCP (“smog”)	kg NMVOCe	7.55E-1	2.13E-1	5.42E-2	1.02E+0	2.27E-1	4.60E-2	3.40E-2	8.75E-2	5.07E-3	-5.28E-2
ADP-minerals & metals	kg Sbe	5.98E-4	1.56E-4	1.73E-5	7.71E-4	2.33E-5	1.70E-6	2.95E-5	3.14E-6	1.24E-6	-1.73E-4
ADP-fossil resources	MJ	1.36E+3	6.64E+2	1.86E+2	2.21E+3	1.63E+2	4.45E+1	1.24E+2	8.45E+1	1.32E+1	-1.29E+2
Water use	m3e depr.	7.65E+3	2.92E+0	1.32E+0	7.65E+3	5.32E-1	1.20E-1	5.50E-1	2.31E-1	4.84E-2	-1.20E+1

GWP = Global Warming Potential; EP = Eutrophication potential; POCP = Photochemical ozone formation; ADP = Abiotic depletion potential.  
EN 15804+A2 disclaimer for Abiotic depletion and Water use and optional indicators except Particulate matter and Ionizing radiation, human health. The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.



## USE OF NATURAL RESOURCES

Impact category	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
Renew. PER as energy	MJ	2.57E+2	9.26E+0	2.41E+1	2.90E+2	1.42E+0	2.50E-1	1.75E+0	4.84E-1	1.35E-1	-1.30E+1
Renew. PER as material	MJ	6.27E+1	0.00E+0	2.90E+1	9.17E+1	0.00E+0	0.00E+0	0.00E+0	-6.27E+1	0.00E+0	0.00E+0
Total use of renew. PER	MJ	3.20E+2	9.26E+0	5.31E+1	3.82E+2	1.42E+0	2.50E-1	1.75E+0	-6.23E+1	1.35E-1	-1.30E+1
Non-re. PER as energy	MJ	2.15E+3	6.64E+2	1.25E+2	2.94E+3	1.63E+2	4.45E+1	1.24E+2	8.45E+1	1.32E+1	-1.29E+2
Non-re. PER as material	MJ	2.32E+2	0.00E+0	6.04E+1	2.93E+2	0.00E+0	0.00E+0	0.00E+0	-2.32E+2	0.00E+0	0.00E+0
Total use of non-re. PER	MJ	2.38E+3	6.64E+2	1.86E+2	3.23E+3	1.63E+2	4.45E+1	1.24E+2	-1.48E+2	1.32E+1	-1.29E+2
Secondary materials	kg	4.85E+1	2.25E-1	3.76E-2	4.88E+1	6.33E-2	1.70E-2	4.15E-2	3.28E-2	3.11E-3	5.18E+1
Renew. secondary fuels	MJ	1.57E+2	2.40E-3	1.81E-4	1.57E+2	3.13E-4	5.70E-5	4.55E-4	1.08E-4	9.25E-5	-1.36E-3
Non-ren. secondary fuels	MJ	4.06E+2	0.00E+0	0.00E+0	4.06E+2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Use of net fresh water	m3	1.18E+2	8.21E-2	8.07E-2	1.18E+2	1.29E-2	2.70E-3	1.55E-2	5.15E-3	1.46E-2	-4.12E-1

PER = Primary energy Resources

## END OF LIFE – WASTE

Impact category	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
Hazardous waste	kg	2.64E+1	7.54E-1	1.96E-1	2.73E+1	1.95E-1	6.00E-2	1.40E-1	1.13E-1	0.00E+0	-2.69E+0
Non-hazardous waste	kg	1.68E+2	1.30E+1	3.63E+0	1.84E+2	2.13E+0	4.20E-1	2.45E+0	7.96E-1	8.50E+1	-2.33E+1
Radioactive waste	kg	7.39E-3	4.57E-3	6.83E-4	1.26E-2	1.14E-3	3.10E-4	8.50E-4	5.97E-4	0.00E+0	-4.76E-4





## END OF LIFE – OUTPUT FLOWS

Impact category	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
Components for re-use	kg	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Materials for recycling	kg	2.91E-2	0.00E+0	0.00E+0	2.91E-2	0.00E+0	0.00E+0	0.00E+0	9.15E+2	0.00E+0	0.00E+0
Materials for energy rec	kg	3.55E-2	0.00E+0	0.00E+0	3.55E-2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Exported energy	MJ	2.51E-2	0.00E+0	0.00E+0	2.51E-2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0

## KEY INFORMATION TABLE (RTS) – KEY INFORMATION PER KG OF PRODUCT

Impact category	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
GWP – total	kg CO2e	2.38E-1	4.59E-2	1.18E-2	2.96E-1	1.24E-2	3.30E-3	8.50E-3	6.28E-3	5.00E-4	-1.06E-2
ADP-minerals & metals	kg Sbe	5.98E-7	1.56E-7	1.73E-8	7.71E-7	2.33E-8	1.70E-9	2.95E-8	3.14E-9	1.24E-9	-1.73E-7
ADP-fossil	MJ	1.36E+0	6.64E-1	1.86E-1	2.21E+0	1.63E-1	4.45E-2	1.24E-1	8.45E-2	1.32E-2	-1.29E-1
Water use	m3e depr.	7.65E+0	2.92E-3	1.32E-3	7.65E+0	5.32E-4	1.20E-4	5.50E-4	2.31E-4	4.84E-5	-1.20E-2
Secondary materials	kg	4.85E-2	2.25E-4	3.76E-5	4.88E-2	6.33E-5	1.70E-5	4.15E-5	3.28E-5	3.11E-6	5.18E-2
Biog. C in product	kg C	N/A	N/A	ND	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Biog. C in packaging	kg C	N/A	N/A	0.00E+0	N/A	N/A	N/A	N/A	N/A	N/A	N/A

## ENVIRONMENTAL IMPACTS – EN 15804+A1. CML / ISO 21930

Impact category	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
Global Warming Pot.	kg CO2e	2.42E+2	4.33E+1	1.15E+1	2.96E+2	1.22E+1	3.30E+0	8.00E+0	6.21E+0	4.89E-1	-1.02E+1
Ozone depletion Pot.	kg CFC-11e	8.74E-6	8.07E-6	1.76E-6	1.86E-5	1.99E-6	5.60E-7	1.50E-6	1.06E-6	1.52E-7	-6.18E-7
Acidification	kg SO2e	5.17E-1	1.76E-1	5.03E-2	7.43E-1	2.48E-1	2.50E-2	2.60E-2	4.69E-2	3.44E-3	-4.68E-2
Eutrophication	kg PO43e	3.87E-1	3.57E-2	9.82E-3	4.33E-1	2.86E-2	5.70E-3	6.00E-3	1.08E-2	8.24E-4	-2.16E-2
POCP (“smog”)	kg C2H4e	7.59E-2	6.49E-3	2.05E-3	8.44E-2	6.41E-3	5.40E-4	1.05E-3	1.02E-3	1.47E-4	-5.07E-3
ADP-elements	kg Sbe	3.36E-3	1.53E-4	1.71E-5	3.53E-3	2.23E-5	1.70E-6	2.90E-5	3.14E-6	1.23E-6	-1.73E-4
ADP-fossil	MJ	2.32E+3	6.64E+2	1.85E+2	3.17E+3	1.63E+2	4.45E+1	1.24E+2	8.45E+1	1.32E+1	-1.29E+2



# EPS 2+3 LAYERS. ROCKWOOL 2+3 LAYERS

## CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2. PEF

Impact category	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
GWP – total	kg CO <sub>2</sub> e	2.23E+2	4.29E+1	1.18E+1	2.78E+2	1.24E+1	3.30E+0	8.50E+0	6.07E+0	1.19E+1	-1.04E+1
GWP – fossil	kg CO <sub>2</sub> e	2.23E+2	4.28E+1	1.18E+1	2.78E+2	1.24E+1	3.30E+0	8.50E+0	6.07E+0	1.19E+1	-1.04E+1
GWP – biogenic	kg CO <sub>2</sub> e	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
GWP – LULUC	kg CO <sub>2</sub> e	1.34E-1	1.66E-2	4.16E-3	1.55E-1	7.20E-3	3.30E-4	3.25E-3	6.03E-4	4.62E-4	-7.91E-3
Ozone depletion pot.	kg CFC <sub>11</sub> e	7.83E-6	9.55E-6	2.09E-6	1.95E-5	2.56E-6	7.10E-7	1.90E-6	1.29E-6	1.87E-7	-6.61E-7
Acidification potential	mol H <sup>+</sup> e	8.44E-1	1.97E-1	6.28E-2	1.10E+0	3.09E-1	3.40E-2	3.35E-2	6.34E-2	5.66E-3	-5.91E-2
EP-fresh-water	kg Pe	9.66E-3	2.99E-4	1.06E-4	1.01E-2	5.35E-5	1.10E-5	6.00E-5	1.98E-5	5.98E-6	-4.10E-4
EP-marine	kg Ne	2.17E-1	5.72E-2	1.72E-2	2.91E-1	7.78E-2	1.50E-2	1.00E-2	2.73E-2	2.12E-3	-9.74E-3
EP-terrestrial	mol Ne	2.34E+0	6.30E-1	1.86E-1	3.16E+0	8.64E-1	1.70E-1	1.10E-1	3.04E-1	2.33E-2	-1.64E-1
POCP (“smog”)	kg NMVOCe	7.51E-1	1.90E-1	5.42E-2	9.96E-1	2.27E-1	4.60E-2	3.40E-2	8.45E-2	6.41E-3	-5.17E-2
ADP-minerals & metals	kg Sbe	6.45E-4	1.47E-4	1.73E-5	8.09E-4	2.33E-5	1.70E-6	2.95E-5	3.04E-6	1.41E-6	-1.67E-4
ADP-fossil resources	MJ	1.55E+3	6.21E+2	1.86E+2	2.36E+3	1.63E+2	4.45E+1	1.24E+2	8.17E+1	1.32E+1	-1.28E+2
Water use	m <sup>3</sup> e depr.	8.32E+3	2.74E+0	1.32E+0	8.32E+3	5.32E-1	1.20E-1	5.50E-1	2.24E-1	3.00E-1	-1.21E+1

GWP = Global Warming Potential; EP = Eutrophication potential; POCP = Photochemical ozone formation; ADP = Abiotic depletion potential.  
EN 15804+A2 disclaimer for Abiotic depletion and Water use and optional indicators except Particulate matter and Ionizing radiation. human health. The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.





## USE OF NATURAL RESOURCES

Impact category	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
Renew. PER as energy	MJ	2.17E+2	8.70E+0	2.41E+1	2.50E+2	1.42E+0	2.50E-1	1.75E+0	4.68E-1	1.31E-1	-1.28E+1
Renew. PER as material	MJ	5.53E+1	0.00E+0	2.90E+1	8.43E+1	0.00E+0	0.00E+0	0.00E+0	-5.53E+1	0.00E+0	0.00E+0
Total use of renew. PER	MJ	2.72E+2	8.70E+0	5.31E+1	3.34E+2	1.42E+0	2.50E-1	1.75E+0	-5.49E+1	1.31E-1	-1.28E+1
Non-re. PER as energy	MJ	1.64E+3	6.21E+2	1.25E+2	2.38E+3	1.63E+2	4.45E+1	1.24E+2	8.17E+1	-1.26E+2	-1.28E+2
Non-re. PER as material	MJ	1.50E+2	0.00E+0	6.04E+1	2.10E+2	0.00E+0	0.00E+0	0.00E+0	-1.50E+2	1.39E+2	0.00E+0
Total use of non-re. PER	MJ	1.79E+3	6.21E+2	1.86E+2	2.59E+3	1.63E+2	4.45E+1	1.24E+2	-6.79E+1	1.33E+1	-1.28E+2
Secondary materials	kg	4.30E+1	2.09E-1	3.76E-2	4.32E+1	6.33E-2	1.70E-2	4.15E-2	3.17E-2	3.87E-3	4.80E+1
Renew. secondary fuels	MJ	1.30E+2	2.26E-3	1.81E-4	1.30E+2	3.13E-4	5.70E-5	4.55E-4	1.04E-4	7.72E-5	-1.33E-3
Non-ren. secondary fuels	MJ	3.86E+2	0.00E+0	0.00E+0	3.86E+2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Use of net fresh water	m3	1.29E+0	7.71E-2	8.07E-2	1.45E+0	1.29E-2	2.70E-3	1.55E-2	4.97E-3	1.64E-2	-4.08E-1

PER = Primary energy resources

## END OF LIFE – WASTE

Impact category	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
Hazardous waste	kg	2.41E+1	7.05E-1	1.96E-1	2.50E+1	1.95E-1	6.00E-2	1.40E-1	1.09E-1	0.00E+0	-2.58E+0
Non-hazardous waste	kg	1.57E+2	1.22E+1	3.63E+0	1.73E+2	2.13E+0	4.20E-1	2.45E+0	7.70E-1	8.81E+1	-2.30E+1
Radioactive waste	kg	3.51E-3	4.27E-3	6.83E-4	8.46E-3	1.14E-3	3.10E-4	8.50E-4	5.77E-4	0.00E+0	-4.78E-4



END OF LIFE – OUTPUT FLOWS

Impact category	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
Components for re-use	kg	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Materials for recycling	kg	2.49E-2	0.00E+0	0.00E+0	2.49E-2	0.00E+0	0.00E+0	0.00E+0	9.12E+2	0.00E+0	0.00E+0
Materials for energy rec	kg	3.86E-2	0.00E+0	0.00E+0	3.86E-2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Exported energy	MJ	2.73E-2	0.00E+0	0.00E+0	2.73E-2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0

KEY INFORMATION TABLE (RTS) – KEY INFORMATION PER KG OF PRODUCT

Impact category	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
GWP – total	kg CO2e	2.23E-1	4.29E-2	1.18E-2	2.78E-1	1.24E-2	3.30E-3	8.50E-3	6.07E-3	1.19E-2	-1.04E-2
ADP-minerals & metals	kg Sbe	6.45E-7	1.47E-7	1.73E-8	8.09E-7	2.33E-8	1.70E-9	2.95E-8	3.04E-9	1.41E-9	-1.67E-7
ADP-fossil	MJ	1.55E+0	6.21E-1	1.86E-1	2.36E+0	1.63E-1	4.45E-2	1.24E-1	8.17E-2	1.32E-2	-1.28E-1
Water use	m3e depr.	8.32E+0	2.74E-3	1.32E-3	8.32E+0	5.32E-4	1.20E-4	5.50E-4	2.24E-4	3.00E-4	-1.21E-2
Secondary materials	kg	4.30E-2	2.09E-4	3.76E-5	4.32E-2	6.33E-5	1.70E-5	4.15E-5	3.17E-5	3.87E-6	4.80E-2
Biog. C in product	kg C	N/A	N/A	ND	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Biog. C in packaging	kg C	N/A	N/A	0.00E+0	N/A	N/A	N/A	N/A	N/A	N/A	N/A

ENVIRONMENTAL IMPACTS – EN 15804+A1. CML / ISO 21930

Impact category	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
Global Warming Pot.	kg CO2e	2.22E+2	4.04E+1	1.15E+1	2.74E+2	1.22E+1	3.30E+0	8.00E+0	6.00E+0	1.19E+1	-9.98E+0
Ozone depletion Pot.	kg CFC-11e	6.98E-6	7.54E-6	1.76E-6	1.63E-5	1.99E-6	5.60E-7	1.50E-6	1.03E-6	1.52E-7	-6.11E-7
Acidification	kg SO2e	5.06E-1	1.54E-1	5.03E-2	7.10E-1	2.48E-1	2.50E-2	2.60E-2	4.53E-2	4.13E-3	-4.63E-2
Eutrophication	kg PO43e	3.67E-1	3.24E-2	9.82E-3	4.10E-1	2.86E-2	5.70E-3	6.00E-3	1.04E-2	1.62E-3	-2.13E-2
POCP (“smog”)	kg C2H4e	8.63E-2	5.82E-3	2.05E-3	9.42E-2	6.41E-3	5.40E-4	1.05E-3	9.82E-4	1.53E-4	-4.93E-3
ADP-elements	kg Sbe	6.38E-4	1.44E-4	1.71E-5	7.99E-4	2.23E-5	1.70E-6	2.90E-5	3.04E-6	1.33E-6	-1.67E-4
ADP-fossil	MJ	1.76E+3	6.21E+2	1.85E+2	2.56E+3	1.63E+2	4.45E+1	1.24E+2	8.17E+1	1.32E+1	-1.28E+2



# MW 2+3 LAYERS

## CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2. PEF

Impact category	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
GWP – total	kg CO <sub>2</sub> e	2.53E+2	4.87E+1	1.18E+1	3.13E+2	1.24E+1	3.30E+0	8.50E+0	6.51E+0	4.59E-1	-1.10E+1
GWP – fossil	kg CO <sub>2</sub> e	2.52E+2	4.87E+1	1.18E+1	3.13E+2	1.24E+1	3.30E+0	8.50E+0	6.51E+0	4.59E-1	-1.10E+1
GWP – biogenic	kg CO <sub>2</sub> e	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
GWP – LULUC	kg CO <sub>2</sub> e	1.95E-1	1.91E-2	4.16E-3	2.18E-1	7.20E-3	3.30E-4	3.25E-3	6.46E-4	4.35E-4	-7.46E-3
Ozone depletion pot.	kg CFC <sub>11</sub> e	1.01E-5	1.08E-5	2.09E-6	2.30E-5	2.56E-6	7.10E-7	1.90E-6	1.38E-6	1.83E-7	-6.75E-7
Acidification potential	mol H <sup>+</sup> e	9.85E-1	2.48E-1	6.28E-2	1.30E+0	3.09E-1	3.40E-2	3.35E-2	6.80E-2	4.35E-3	-6.14E-2
EP-fresh-water	kg Pe	1.36E-2	3.36E-4	1.06E-4	1.40E-2	5.35E-5	1.10E-5	6.00E-5	2.13E-5	4.79E-6	-4.08E-4
EP-marine	kg Ne	2.39E-1	7.09E-2	1.72E-2	3.27E-1	7.78E-2	1.50E-2	1.00E-2	2.93E-2	1.48E-3	-9.74E-3
EP-terrestrial	mol Ne	2.82E+0	7.82E-1	1.86E-1	3.79E+0	8.64E-1	1.70E-1	1.10E-1	3.26E-1	1.65E-2	-1.69E-1
POCP (“smog”)	kg NMVOCe	7.90E-1	2.33E-1	5.42E-2	1.08E+0	2.27E-1	4.60E-2	3.40E-2	9.06E-2	4.79E-3	-5.52E-2
ADP-minerals & metals	kg Sbe	1.27E-3	1.65E-4	1.73E-5	1.46E-3	2.33E-5	1.70E-6	2.95E-5	3.26E-6	1.04E-6	-1.86E-4
ADP-fossil resources	MJ	1.73E+3	7.03E+2	1.86E+2	2.62E+3	1.63E+2	4.45E+1	1.24E+2	8.76E+1	1.26E+1	-1.32E+2
Water use	m <sup>3</sup> e depr.	7.16E+3	3.09E+0	1.32E+0	7.16E+3	5.32E-1	1.20E-1	5.50E-1	2.39E-1	4.01E-2	-1.18E+1

GWP = Global Warming Potential; EP = Eutrophication potential; POCP = Photochemical ozone formation; ADP = Abiotic depletion potential.

EN 15804+A2 disclaimer for Abiotic depletion and Water use and optional indicators except Particulate matter and Ionizing radiation. human health. The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.







## USE OF NATURAL RESOURCES

Impact category	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
Renew. PER as energy	MJ	2.58E+2	9.77E+0	2.41E+1	2.92E+2	1.42E+0	2.50E-1	1.75E+0	5.02E-1	1.09E-1	-1.35E+1
Renew. PER as material	MJ	5.04E+1	0.00E+0	2.90E+1	7.94E+1	0.00E+0	0.00E+0	0.00E+0	-5.04E+1	0.00E+0	0.00E+0
Total use of renew. PER	MJ	3.08E+2	9.77E+0	5.31E+1	3.71E+2	1.42E+0	2.50E-1	1.75E+0	-4.99E+1	1.09E-1	-1.35E+1
Non-re. PER as energy	MJ	2.10E+3	7.03E+2	1.25E+2	2.93E+3	1.63E+2	4.45E+1	1.24E+2	8.76E+1	1.26E+1	-1.32E+2
Non-re. PER as material	MJ	1.08E+1	0.00E+0	6.04E+1	7.12E+1	0.00E+0	0.00E+0	0.00E+0	-1.08E+1	0.00E+0	0.00E+0
Total use of non-re. PER	MJ	2.11E+3	7.03E+2	1.86E+2	3.00E+3	1.63E+2	4.45E+1	1.24E+2	7.68E+1	1.26E+1	-1.32E+2
Secondary materials	kg	6.22E+1	2.38E-1	3.76E-2	6.25E+1	6.33E-2	1.70E-2	4.15E-2	3.40E-2	2.61E-3	5.65E+1
Renew. secondary fuels	MJ	1.70E+2	2.53E-3	1.81E-4	1.70E+2	3.13E-4	5.70E-5	4.55E-4	1.12E-4	6.88E-5	-1.43E-3
Non-ren. secondary fuels	MJ	4.11E+2	0.00E+0	0.00E+0	4.11E+2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Use of net fresh water	m3	1.66E+0	8.66E-2	8.07E-2	1.83E+0	1.29E-2	2.70E-3	1.55E-2	5.33E-3	1.39E-2	-4.23E-1

PER = Primary energy resources

## END OF LIFE - WASTE

Impact category	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
Hazardous waste	kg	2.98E+1	8.00E-1	1.96E-1	3.08E+1	1.95E-1	6.00E-2	1.40E-1	1.17E-1	0.00E+0	-2.97E+0
Non-hazardous waste	kg	2.14E+2	1.37E+1	3.63E+0	2.31E+2	2.13E+0	4.20E-1	2.45E+0	8.25E-1	8.71E+1	-2.40E+1
Radioactive waste	kg	4.53E-3	4.85E-3	6.83E-4	1.01E-2	1.14E-3	3.10E-4	8.50E-4	6.19E-4	0.00E+0	-4.69E-4

END OF LIFE – OUTPUT FLOWS

Impact category	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
Components for re-use	kg	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Materials for recycling	kg	3.11E-2	0.00E+0	0.00E+0	3.11E-2	0.00E+0	0.00E+0	0.00E+0	9.13E+2	0.00E+0	0.00E+0
Materials for energy rec	kg	3.32E-2	0.00E+0	0.00E+0	3.32E-2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Exported energy	MJ	2.35E-2	0.00E+0	0.00E+0	2.35E-2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0

KEY INFORMATION TABLE (RTS) – KEY INFORMATION PER KG OF PRODUCT

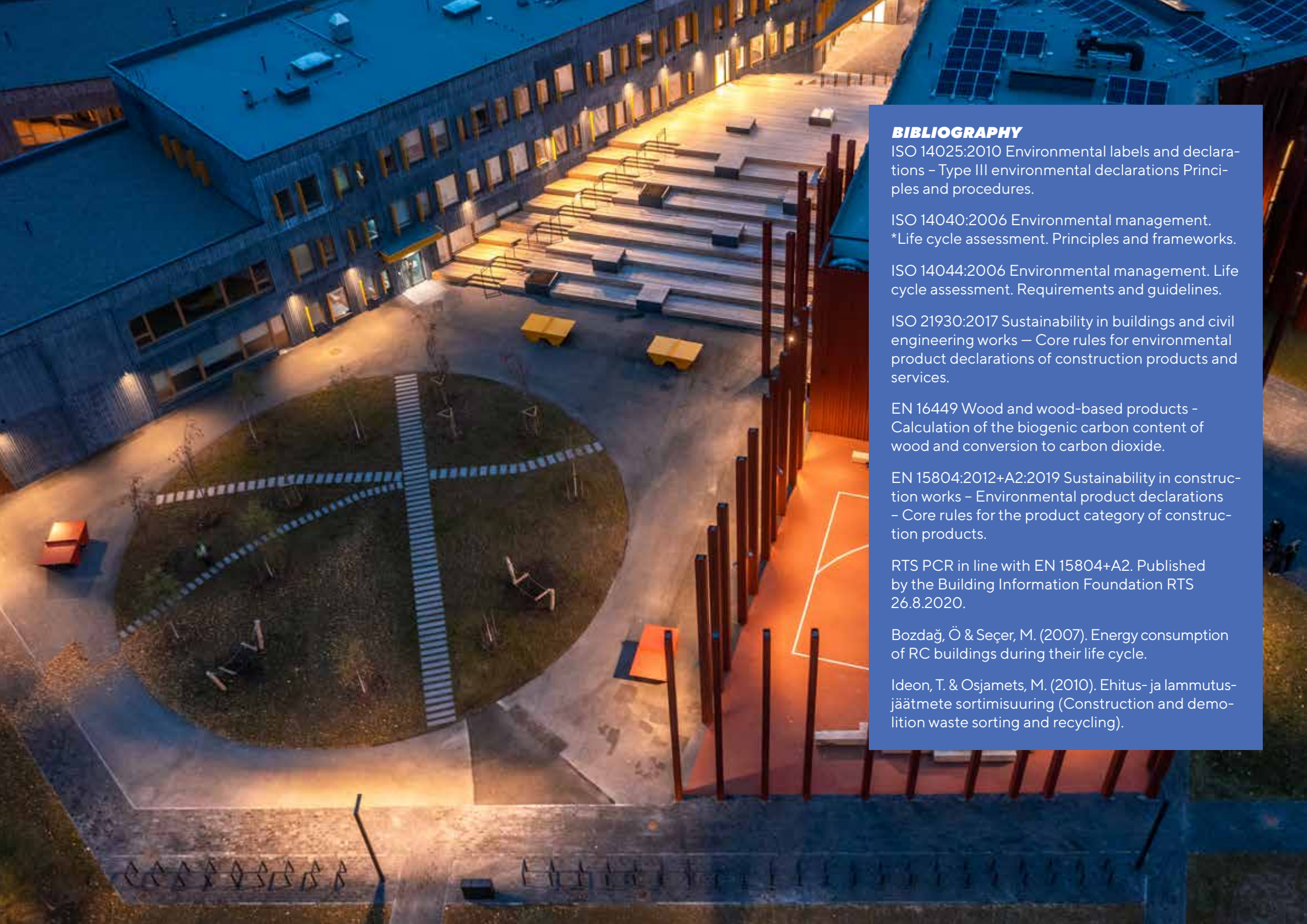
Impact category	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
GWP – total	kg CO2e	2.53E-1	4.87E-2	1.18E-2	3.13E-1	1.24E-2	3.30E-3	8.50E-3	6.51E-3	4.59E-4	-1.10E-2
ADP-minerals & metals	kg Sbe	1.27E-6	1.65E-7	1.73E-8	1.46E-6	2.33E-8	1.70E-9	2.95E-8	3.26E-9	1.04E-9	-1.86E-7
ADP-fossil	MJ	1.73E+0	7.03E-1	1.86E-1	2.62E+0	1.63E-1	4.45E-2	1.24E-1	8.76E-2	1.26E-2	-1.32E-1
Water use	m3e depr.	7.16E+0	3.09E-3	1.32E-3	7.16E+0	5.32E-4	1.20E-4	5.50E-4	2.39E-4	4.01E-5	-1.18E-2
Secondary materials	kg	6.22E-2	2.38E-4	3.76E-5	6.25E-2	6.33E-5	1.70E-5	4.15E-5	3.40E-5	2.61E-6	5.65E-2
Biog. C in product	kg C	N/A	N/A	ND	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Biog. C in packaging	kg C	N/A	N/A	0.00E+0	N/A	N/A	N/A	N/A	N/A	N/A	N/A

ENVIRONMENTAL IMPACTS – EN 15804+A1. CML / ISO 21930

Impact category	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
Global Warming Pot.	kg CO2e	2.52E+2	4.59E+1	1.15E+1	3.09E+2	1.22E+1	3.30E+0	8.00E+0	6.43E+0	4.49E-1	-1.05E+1
Ozone depletion Pot.	kg CFC-11e	9.09E-6	8.55E-6	1.76E-6	1.94E-5	1.99E-6	5.60E-7	1.50E-6	1.10E-6	1.48E-7	-6.34E-7
Acidification	kg SO2e	6.26E-1	1.94E-1	5.03E-2	8.71E-1	2.48E-1	2.50E-2	2.60E-2	4.86E-2	3.22E-3	-4.81E-2
Eutrophication	kg PO43e	4.25E-1	3.87E-2	9.82E-3	4.74E-1	2.86E-2	5.70E-3	6.00E-3	1.12E-2	7.05E-4	-2.21E-2
POCP (“smog”)	kg C2H4e	7.22E-2	7.07E-3	2.05E-3	8.14E-2	6.41E-3	5.40E-4	1.05E-3	1.05E-3	1.39E-4	-5.41E-3
ADP-elements	kg Sbe	8.41E-4	1.62E-4	1.71E-5	1.02E-3	2.23E-5	1.70E-6	2.90E-5	3.26E-6	1.04E-6	-1.86E-4
ADP-fossil	MJ	2.06E+3	7.03E+2	1.85E+2	2.95E+3	1.63E+2	4.45E+1	1.24E+2	8.76E+1	1.26E+1	-1.32E+2







## **BIBLIOGRAPHY**

ISO 14025:2010 Environmental labels and declarations – Type III environmental declarations Principles and procedures.

ISO 14040:2006 Environmental management.  
\*Life cycle assessment. Principles and frameworks.

ISO 14044:2006 Environmental management. Life cycle assessment. Requirements and guidelines.

ISO 21930:2017 Sustainability in buildings and civil engineering works – Core rules for environmental product declarations of construction products and services.

EN 16449 Wood and wood-based products - Calculation of the biogenic carbon content of wood and conversion to carbon dioxide.

EN 15804:2012+A2:2019 Sustainability in construction works – Environmental product declarations – Core rules for the product category of construction products.

RTS PCR in line with EN 15804+A2. Published by the Building Information Foundation RTS 26.8.2020.

Bozdağ, Ö & Seçer, M. (2007). Energy consumption of RC buildings during their life cycle.

Ideon, T. & Osjamets, M. (2010). Ehitus- ja lammutus-jäätmete sortimisuuring (Construction and demolition waste sorting and recycling).





**AS Framm**  
Vana Narva str. 8  
74114 Maardu  
Estonia

[framm@framm.ee](mailto:framm@framm.ee)  
[framm.ee](http://framm.ee)