ISOSPAN Baustoffwerk GmbH

ENVIRONMENTAL PRODUCT DECLARATION

Wood-chip concrete shuttering blocks PLANT Ramingstein/Austria

in compliance with ISO 14025 and EN 15804

Program Operator	BAU EPD GmbH
Publisher	EPDItaly

Declaration Number	EPD-ISOSPAN-2017-4-Ecoinvent
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General information

Product name ISOSPAN N 15 ISOSPAN N 18 ISOSPAN N 20 ISOSPAN N 22 ISOSPAN N 25 ISOSPAN I 25 ISOSPAN I 30 ISOSPAN TW 30	**Declared product / declared unit** Wood-chip concrete shuttering blocks for use as inner and outer walls. The product is manufactured from wood-chips, cement and water and is filled with concrete at the building site. The surface weight of the finished wall ranges from 213 kg/m² to 487 kg/m², the thermal conductivity is, depending on the model, between 0.263 W/mK and 0.370 W/mK. One square metre of wall (m²) has been determined as the functional unit.
Declaration number EPD-ISOSPAN-2017-4-ECOINVENT	**Range of validity** The life cycle inventory analysis data are representative of all of the wood-chip concrete shuttering blocks without insulation produced by ISOSPAN Baustoffwerk GmbH in 2015 at the Ramingstein production site. The owner of the declaration is liable for the underlying information and evidence; Bau EPD GmbH is not liable with respect to manufacturer information, life cycle assessment data and evidence.
Declaration data ☒ Specific data ☐ Average data	
Declaration based on: PCR Prefabricated concrete products PCR code: 2.17.1 Version 16.05.2016 (PCR tested and approved by the independent expert committee = PKR-Gremium)	
Type of declaration as per OENORM EN 15804 From cradle to grave	**Database, software, version** Ecoinvent v.2.2, SimaPro 8
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Information:
EPDs from similar product groups from different programmes might not be comparable.

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1 Product / system description

1.1 General product description

The products being examined are N 15, N 18, N 20, N 22, N 25, I 25, I 30 and TW 30. These are shuttering blocks made of wood-chip concrete as wall elements that can be used as lost shuttering for unreinforced and reinforced in-situ concrete walls. The product falls into the product group of prefabricated concrete products.

The life cycle inventory analysis data are representative of all of the wood-chip concrete shuttering blocks without integrated insulating material produced by ISOSPAN Baustoffwerk GmbH in 2015 at the Ramingstein production site. The mantle blocks are filled with reinforced filling concrete at the building site. The average bulk density of the wood concrete mass is 550 kg/m³, the thermal conductivity of the examined products ranges from 0.263 W/mK to 0.370 W/mK.

1.2 Product-related standards, regulations and guidelines

The following product-related standards, regulations and guidelines were taken into consideration:

- OENORM EN 14474:2012-09-01 – Precast concrete products – Concrete with wood-chips as aggregate – Requirements and test methods
- OENORM EN 15498:2008-10-01 – Precast concrete products – Wood-chip concrete shuttering blocks – Product properties and performance
- OENORM EN 16757:2016-07-01 – Sustainability of construction works – Environmental product declarations – Product Category Rules for concrete and concrete elements
- EC Certificate of Conformity 1159-CPD-0285/11 from 19 June 2013
- European Technical Approval from 15 May 2013 (ETA-05/0261)

According to the above ETA, conformity with the now annulled Directive 89/106/EEC was granted. According to Article 66 of the (successor) Regulation (EU) No. 305/2011, there is conformity with this Regulation.

1.3 Areas of application

According to the European Technical Approval, the shuttering blocks made of wood-chip concrete are suitable for constructing aboveground and underground load-bearing or non-load-bearing inner and outer walls. Use of the shuttering system as free-standing walls or noise-insulating walls is also possible.

1.4 Technical data

The following table contains structural/technical data relevant for the normal blocks without insulation.

Table 1: Technical data

Description	N 15	N 18	N 20	N 22	Unit
Block dimensions: Width Height Length	 0.15 0.25 1.10	 0.18 0.25 1.25	 0.20 0.25 1.25	 0.22 0.25 1.00	 m m m
Thermal conductivity	0.263	0.290	0.282	0.301	W/mK
Water vapour diffusion resistance	-	-	-	-	-
Bulk density (concrete block)	550	550	550	550	kg/m³
Tensile strength	> 0.15	> 0.15	> 0.15	> 0.15	N/mm²
Dry bulk density (oven-dried)	550	550	550	550	kg/m³
Weighted sound reduction index Rw	52	55	56	57	dB
Description	**N 25**	**I 25**	**I30**	**TW 30**	**Unit**
Block dimensions: Width Height Length	 0.25 0.25 1.25	 0.25 0.25 1.25	 0.30 0.25 1.25	 0.30 0.25 1.25	 m m m
Thermal conductivity	0.281	0.352	0.370	0.313	W/mK
Water vapour diffusion resistance	-	-	-	-	-
Bulk density (concrete block)	550	550	550	550	kg/m³
Tensile strength	> 0.15	> 0.15	> 0.15	> 0.15	N/mm²
Dry bulk density (oven-dried)	550	550	550	550	kg/m³
Weighted sound reduction index Rw	59	60	62	61	dB

1.5 Conditions of delivery

The products are delivered without pallets, but in the dimensions of a Europool pallet. The goods are stored without packaging in the open air until delivery.

2 Description of life cycle

2.1 Base materials (main components and auxiliary materials)

Table 2: Base materials of the examined products

Components of wood concrete:	**kg/kg**			
Wood-chips	0.530			
Cement	0.445			
Water	0.025			
Components of wood-chip concrete shuttering blocks:	**N 15**	**N 18**	**N 20**	**N22**
	kg/m²	**kg/m²**	**kg/m²**	**kg/m²**
Wood concrete	59.0	49.0	62.2	60.8
Components of wood-chip concrete shuttering blocks:	**N 25**	**I 25**	**I 30**	**TW 30**
	kg/m²	**kg/m²**	**kg/m²**	**kg/m²**
Wood concrete	78.0	77.8	82.2	105.4

Table 3: Further components for 1 m² of wall (declared unit)

Components of wall:	**N 15**	**N 18**	**N 20**	**N 22**
	kg/m²	**kg/m²**	**kg/m²**	**kg/m²**
Wood-chip concrete shuttering blocks	59.0	49.0	62.2	60.8
Filling concrete *	154	220	228.8	266.2
Reinforcing steel *	0.3	0.3	0.3	0.3
Components of wall:	**N 25**	**I 25**	**I 30**	**TW 30**
	kg/m²	**kg/m²**	**kg/m²**	**kg/m²**
Wood-chip concrete shuttering blocks	78.0	77.8	82.2	105.4
Filling concrete *	286	321.2	404.8	336.6
Reinforcing steel *	0.3	0.3	0.3	0.3

*The reinforcing steel and filling concrete are inserted in the wall on the building site and are therefore taken into consideration in construction stage A5

2.2 Production

The wood-chip concrete is produced at the plant in Ramingstein. Here wood-chips, cement and water are mixed and filled into moulding boxes. Then the blocks harden in the air and are milled to the same height.

2.3 Packaging

The hardened blocks are stored without packaging in the open air.

2.4 Transport

The wood-chip concrete shuttering blocks are transported from the manufacturing plant to the customer by truck. The average transport distance is 145 km.

2.5 Processing and installation

The mantle blocks are placed next to each other and on top of each other without grout. It must be ensured that there is level ground and, if necessary, this must be created using levelling grout for the first set of blocks. Then the mantle blocks are filled with concrete and this is compacted using internal vibrators. Corresponding processing guidelines are provided by the manufacturer.

2.6 Use stage

2.6.1 Use condition

With proper planning, correct and appropriate installation and disruption-free use there is no change in the material composition over the entire service life.

2.6.2 Environment & health during use

There are no known effects on the environment and health coming from the product. The result of the measurement to determine radioactivity is clearly below the limit stipulated in OENORM S 5200.

2.6.3 Reference service life (RSL)

The service life is the period of time from the installation of the product in the building up to disposal.

Table 4: Reference service life for wood-chip concrete shuttering blocks

Description	Value	Unit
Wood-chip concrete shuttering blocks with core concrete	100	Years

2.7 End-of-life stage

2.7.1 Re-use and recycling

The product cannot be re-used because it cannot be dismantled in a non-destructive way. Recycling at the end of the product life cycle would be conceivable but, on account of the high expense required for separating the building component layers and subsequent processing, this is not carried out.

2.7.2 Disposal

The product can be stored in construction waste landfills after the demolition of the building.

3 Life cycle assessment

3.1 Methodological assumptions

As the basis for the calculation of the life cycle assessment the method of CML 2001 v 4.1 (“baseline”) dated from October 2012 (Institute of Environmental Sciences, Faculty of Science, University of Leiden, Netherlands) is used.

3.1.1 Type of EPD, system boundary

In this EPD all stages of the life cycle from cradle to grave are examined. Benefits and loads beyond the product system boundary are not declared.

3.1.2 Declared unit/functional unit

The declared unit is 1 m² of wall. In this report the functional unit corresponds with the declared unit.

Table 5: Declared unit

Description	Declared unit	Wood-chip concrete shuttering blocks	Filling concrete	Reinforcing steel	Total weight of the wall
	m²	kg/m²	kg/m²	kg/m²	kg/m²
N 15	1	59	154	0.3	213
N 18	1	49	220	0.3	269
N 20	1	62.2	228.8	0.3	291
N 22	1	60.8	266.2	0.3	327
N 25	1	78	286	0.3	364
I 25	1	77.8	321.2	0.3	399
I 30	1	82.2	404.8	0.3	487
TW 30	1	105.4	336.6	0.3	442

3.1.3 Calculation of averages

At the production plant mantle blocks and absorber elements for noise-insulating walls are manufactured. The energy consumption data were averaged over the entire production range.

3.1.4 Estimations and assumptions

For infrastructure data such as the machinery no specific data were collected, instead data sets of ecoinvent were used. The heat value of the wood-chips to calculate the renewable energy requirement was taken from ecoinvent and amounts to 17.2 MJ/kg wood. From the European Technical Approval it can be seen that the strength class of the filling concrete must at least correspond with class C16/20. Therefore, as a conservative assumption, concrete of strength class C20/25 was used as the filling concrete.
As reinforcing steel the data set of ecoinvent with a secondary share of 37% was used.

3.1.5 Cut-off criteria

All used raw materials were considered. Auxiliary materials such as lubricating oils and cleaning agents were ignored after a sensitivity analysis on the basis of a study of the National Brick Associations of Germany, Austria and Switzerland (cf. Bruck 1996).

In the upstream chains of the substances the general life cycle assessment rules of Bau-EPD GmbH were taken into consideration.

3.1.6 Data

The used data fulfil the following quality requirements:

- The data sets are up to date (production year 2015).
- There was compliance with the criteria of Bau EPD GmbH for data collection, generic data and cut-off of material and energy flows.

- A data validation as per EN ISO 14044:2006 was carried out.
- The used data correspond with the yearly average of the reference year.
- All essential data like energy and raw material demand, transport distances and packaging within the system boundary were provided by the manufacturer.
- The data are plausible, meaning that deviations from comparable results (other manufacturers, literature, similar products) are comprehensible.
- Data sets from ecoinvent v2.2 were used as the source of the background data.

3.1.7 Reporting period

All manufacturer-specific data concern the entire production quantity in 2015.

3.1.8 Allocation

The loads for the manufacture of the wood-chips are economically allocated by ecoinvent.

3.2 Information on the life cycle for the assessment

Table 6: Declared life cycle stages

PRODUCT STAGE			CON-STRUC-TION STAGE		USE STAGE							END-OF-LIFE STAGE				BENEFITS AND LOADS
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Raw material supply	Transport	Manufacture	Transport	Construction/installation	Use	Maintenance	Repair	Replacement	Conversion, renovation	Energy use for operations	Water use for operations	Demolition	Transport	Waste management	Disposal	Potential for reuse, recovery, recycling
x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	MND

X = included in life cycle assessment; MND = module not declared

3.2.1 A1-A3 Product stage

The wood-chips used are delivered by various sawmills from the region. They are cut up, blown through a tunnel into the production hall and here they are mixed with recycled grit of wood-chip concrete, cement and water. The wood-chip concrete mass thus created is finally shaped into mantle blocks in moulding boxes, compacted by shaking and stored in the drying zone for at least 24 h until hard. Subsequently the blocks are made the same height and length using a milling machine. The finished products are stacked in the open air at the storage location in the format of a Europool pallet.

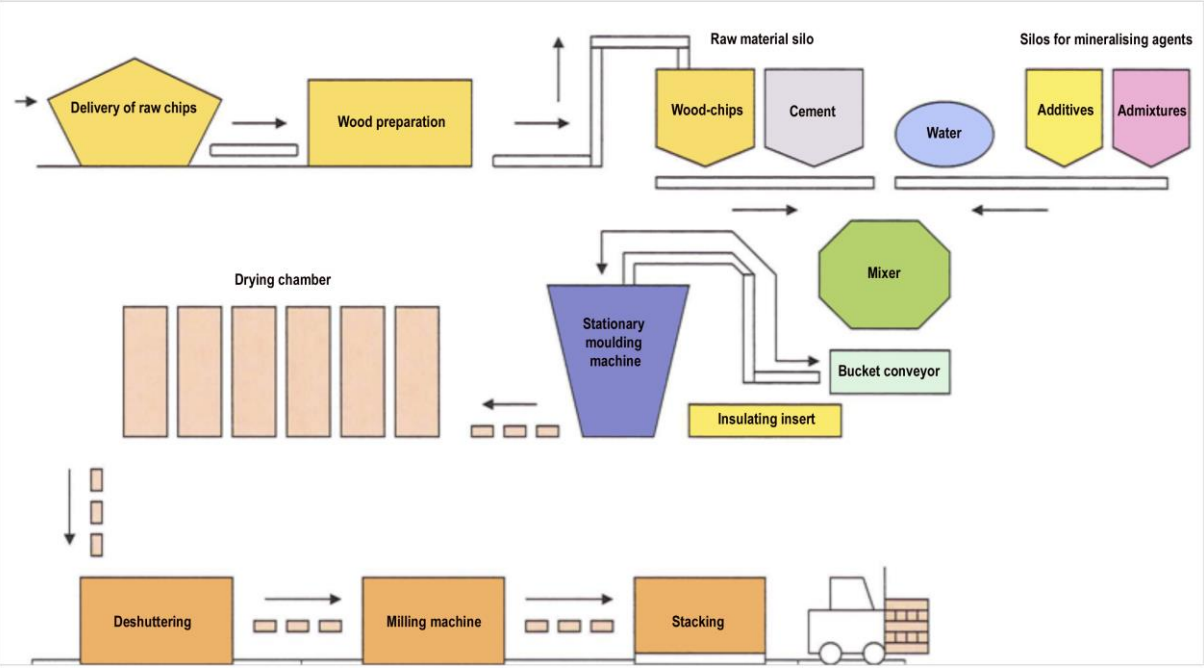
The energy required for the production processes is covered by electricity. In winter, heating oil is additionally used to heat the production hall. Five diesel-powered forklift trucks are also used on the plant premises.

Table 7: Energy and water consumption for manufacturing per m² product

Description	Value	Measurement
Energy consumption broken down by energy carrier:		
Electricity	7.112	MJ/m²
Heating oil	2.759	MJ/m²
Diesel	1.440	MJ/m²
Fresh water consumption from rain water	-	m³/m²
Fresh water consumption from surface water	-	m³/m²
Fresh water consumption from well water	8.64E-03	m³/m²

Fresh water consumption from public water supply	-	m^3/m^2

Figure 1: Diagram of the product stage (A1-A3) [ISOSPAN Baustoffwerk GmbH]



The sketched silos for mineralising agents and the addition of the insulating insert concern other products produced at the location and are therefore not used in the production of the wood-chip concrete shuttering blocks examined here.

3.2.2 A4-A5 Construction stage

The products are transported to the building site by truck. The average delivery distance is 100 km within Austria and 350 km for deliveries abroad. 82% of the products are used in buildings in Austria and 18% abroad. This gives an average delivery radius of 145 km for the wood-chip concrete shuttering blocks and the reinforcing steel. The filling concrete comes from regional concrete plants via concrete-mixing trucks from an average distance of 15 km. According to OENORM EN 16757, the environmental effects of the production of filling concrete and reinforcing steel are taken into consideration in stage A5.

Table 8: Description of the scenario for "Transport to the building site (A4)" (as per Table 7 in OENORM EN 15804)

Parameters to describe the transport to the building site (A4)	Value	Measurement
Average transport distance for wood-chip concrete shuttering blocks and reinforcing steel	145	km
Transport distance for the filling concrete	15	km
Vehicle type according to Commission Directive 2007/37/EC (European Emission Standard)		-
Average fuel consumption, fuel type: ….		l/100 km
Average transport mass		t
Average capacity utilisation (including empty returns)		%
Average bulk density of transported products		t/m^3
Volume capacity utilisation factor (factor: =1 or <1 or ≥ 1 for compressed or nested packaged products)	< 1	-

Table 9: Description of the scenario for "Installation of the product in the building (A5)" (as per Table 8 in OENORM EN 15804)

Parameters to describe the installation of the product in the building (A5)	Value	Measurement
Auxiliary materials for installation (specified by material)	-	kg/m³ t/m³ l/m³
Tools for installation (specified by type)	-	-
Other product components: Filling concrete (of strength class C20/25) Reinforcing steel (37% secondary share)	 154-405 0,3	 kg/m² kg/m²
Water consumption	-	m³/m³ l/m³
Other resource use	-	kg/m³ t/m³ l/m³
Electricity consumption	-	kWh or MJ/m³
Other energy carriers: …….	-	kWh or MJ/m³
Wastage of materials on the building site before waste processing, generated by the product's installation (specified by material)	0.03	m²/m²
Output materials (specified by material) as a result of waste processing at the building site, e.g. of collection for recycling, for energy recovery, disposal (specified by route)	0.03 waste for recycling	m²/m²
Direct emissions to ambient air (e.g. dust, VOC), soil and water	-	kg/m³

3.2.3 B1-B7 Use stage

During the use stage of the product there are no material and energy flows relevant for the life cycle assessment.

3.2.4 C1-C4 End-of-life stage

The end-of-life stage of the wood-chip concrete shuttering blocks begins with the demolition of the building. It must be assumed that the inhomogeneous layers of the products are not separated but rather are disposed of together on construction waste landfills. A distance of 50 km was calculated as the average distance to the landfill.

Table 10: Description of the scenario for "Disposal of the product (C1 to C4)" (as per Table 12 in OENORM EN 15804)

Parameters for end-of-life stage (C1-C4)	Value	Measurement per m²
Collection process specified by type	- 0.213 to 0.487	t collected separately t collected with mixed construction waste
Recovery system specified by type	- - -	t for re-use t for recycling t for energy recovery
Disposal specified by type	Entire wall 0.213 to 0.487	t product or material for final deposition

3.2.5 D Potential for reuse, recovery and recycling

The products cannot be dismantled non-destructively. Separation of the individual fractions is unlikely. Therefore no scenario regarding reuse, recovery and recycling has been calculated.

3.3 Declaration of environmental indicators

The impact assessment parameters listed in OENORM EN 15804:2014 are calculated.

It should be noted that the impact assessment results are only relative statements that do not include any statements about “end-points” of the impact categories, exceeding of thresholds, safety margins or risks.

For the global warming potential (GWP) the results are indicated with a division into "GWP process", "GWP C content" and "GWP total". GWP process contains all CO_2-equivalent emissions arising in the considered life cycle stages of the product. The "GWP C content" describes the share of carbon (biogenic CO_2) stored in renewable products. The corresponding values for specific materials are taken from "ecoinvent" and are displayed as negative numbers. The "GWP total" results from the sum of "GWP process" and "GWP C content".

3.3.1 Results of the product N 15

Table 11: Parameters to describe the impact assessment of the product N 15 per m² (ecoinvent 2.2)

Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
GWP process	kg CO_2 equiv	2.12E+01	1.41E+00	1.65E+01	0.00E+00	8.52E-01	1.76E+00	0.00E+00	1.51E+00
GWP C content	kg CO_2 equiv	-5.66E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.12E+01
GWP total	kg CO_2 equiv	-3.54E+01	1.41E+00	1.65E+01	0.00E+00	8.52E-01	1.76E+00	0.00E+00	4.27E+01
ODP	kg CFC-11 equiv	6.73E-07	2.24E-07	4.62E-07	0.00E+00	1.06E-07	2.79E-07	0.00E+00	4.53E-07
AP	kg SO_2 equiv	3.26E-02	5.42E-03	3.18E-02	0.00E+00	6.55E-03	6.75E-03	0.00E+00	8.99E-03
EP	kg PO_4^{3-} equiv	2.27E-02	1.45E-03	2.02E-02	0.00E+00	1.53E-03	1.80E-03	0.00E+00	2.20E-03
POCP	kg C_2H_4 equiv	6.50E-03	7.45E-04	5.09E-03	0.00E+00	7.74E-04	9.27E-04	0.00E+00	1.62E-03
ADPE	kg Sb equiv	8.02E-06	3.90E-06	9.03E-06	0.00E+00	1.35E-07	4.86E-06	0.00E+00	1.63E-06
ADPF	MJ H_u	1.22E+02	2.07E+01	9.86E+01	0.00E+00	1.17E+01	2.58E+01	0.00E+00	3.76E+01
Legend		GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources							

Table 12: Parameters to describe the resource use of the product N 15 per m² (ecoinvent 2.2)

Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
PERE	MJ H_u	1.72E+01	2.95E-01	6.55E+00	0.00E+00	4.73E-02	3.67E-01	0.00E+00	3.04E-01
PERM	MJ H_u	5.38E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ H_u	5.55E+02	2.95E-01	6.55E+00	0.00E+00	4.73E-02	3.67E-01	0.00E+00	3.04E-01
PENRE	MJ H_u	1.60E+02	2.19E+01	1.34E+02	0.00E+00	1.21E+01	2.73E+01	0.00E+00	3.95E+01
PENRM	MJ H_u	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 H_u	1.60E+02	2.19E+01	1.34E+02	0.00E+00	1.21E+01	2.73E+01	0.00E+00	3.95E+01
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 H_u	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 H_u	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	m³	8.75E-02	8.04E-04	3.04E-02	0.00E+00	2.41E-04	1.00E-03	0.00E+00	4.02E-03
Legend		PERE = Renewable primary energy as energy carrier; PERM = Renewable primary energy resources as material utilisation; PERT = Total use of renewable primary energy resources; PENRE = Non-renewable primary energy as energy carrier; PENRM = Non-renewable primary energy as material utilisation; 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							

Table 13: Parameters to describe the waste categories of the product N 15 per m² (ecoinvent 2.2)

Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
HWD	kg	1.49E-04	2.20E-05	1.54E-04	0.00E+00	6.19E-06	2.74E-05	0.00E+00	1.55E-05
NHWD	kg	4.94E-01	1.38E-01	1.78E+00	0.00E+00	7.94E-03	1.72E-01	0.00E+00	2.13E+02
RWD	kg	2.77E-04	3.26E-05	4.00E-04	0.00E+00	6.20E-06	4.05E-05	0.00E+00	3.37E-05
Legend		HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed							

Table 14: Parameters to describe the potential of waste treatment and recovery in the end-of-life stage of the product N 15 per m² (ecoinvent 2.2)

Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
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	0.00E+00	0.00E+00	0.00E+00	0.00E+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
EEE	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
EET	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
Legend		CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electric energy; EET = Exported thermal energy							

3.3.2 Results of the product N 18

Table 15: Parameters to describe the impact assessment of the product N 18 per m² (ecoinvent 2.2)

Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
GWP process	kg CO_2 equiv	1.78E+01	1.17E+00	2.33E+01	0.00E+00	1.08E+00	2.22E+00	0.00E+00	1.91E+00
GWP C content	kg CO_2 equiv	-4.70E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.00E+01
GWP total	kg CO_2 equiv	-2.92E+01	1.17E+00	2.33E+01	0.00E+00	1.08E+00	2.22E+00	0.00E+00	4.19E+01
ODP	kg CFC-11 equiv	5.80E-07	1.86E-07	6.43E-07	0.00E+00	1.34E-07	3.52E-07	0.00E+00	5.72E-07
AP	kg SO_2 equiv	2.76E-02	4.50E-03	4.46E-02	0.00E+00	8.27E-03	8.52E-03	0.00E+00	1.13E-02
EP	kg PO_4^{3-} equiv	1.92E-02	1.20E-03	2.83E-02	0.00E+00	1.93E-03	2.27E-03	0.00E+00	2.78E-03
POCP	kg C_2H_4 equiv	5.47E-03	6.19E-04	7.10E-03	0.00E+00	9.78E-04	1.17E-03	0.00E+00	2.05E-03
ADPE	kg Sb equiv	6.71E-06	3.24E-06	1.26E-05	0.00E+00	1.71E-07	6.13E-06	0.00E+00	2.05E-06
ADPF	MJ H_u	1.05E+02	1.72E+01	1.37E+02	0.00E+00	1.48E+01	3.26E+01	0.00E+00	4.75E+01
Legend		GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources							

Table 16: Parameters to describe the resource use of the product N 18 per m² (ecoinvent 2.2)

Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
PERE	MJ H_u	1.50E+01	2.45E-01	9.28E+00	0.00E+00	5.98E-02	4.64E-01	0.00E+00	3.84E-01
PERM	MJ H_u	4.47E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ H_u	4.62E+02	2.45E-01	9.28E+00	0.00E+00	5.98E-02	4.64E-01	0.00E+00	3.84E-01
PENRE	MJ H_u	1.35E+02	1.82E+01	1.88E+02	0.00E+00	1.52E+01	3.45E+01	0.00E+00	4.99E+01
PENRM	MJ H_u	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 H_u	1.35E+02	1.82E+01	1.88E+02	0.00E+00	1.52E+01	3.45E+01	0.00E+00	4.99E+01
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 H_u	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 H_u	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	7.29E-02	6.67E-04	4.31E-02	0.00E+00	3.04E-04	1.26E-03	0.00E+00	5.07E-03
Legend		PERE = Renewable primary energy as energy carrier; PERM = Renewable primary energy resources as material utilisation; PERT = Total use of renewable primary energy resources; PENRE = Non-renewable primary energy as energy carrier; PENRM = Non-renewable primary energy as material utilisation; 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							

Table 17: Parameters to describe the waste categories of the product N 18 per m² (ecoinvent 2.2)

Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
HWD	kg	1.28E-04	1.83E-05	2.03E-04	0.00E+00	7.82E-06	3.46E-05	0.00E+00	1.96E-05
NHWD	kg	4.16E-01	1.15E-01	2.51E+00	0.00E+00	1.00E-02	2.17E-01	0.00E+00	2.69E+02
RWD	kg	2.37E-04	2.70E-05	5.63E-04	0.00E+00	7.83E-06	5.12E-05	0.00E+00	4.25E-05
Legend		HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed							

Table 18: Parameters to describe the potential of waste treatment and recovery in the end-of-life stage of the product N 18 per m² (ecoinvent 2.2)

Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
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	0.00E+00	0.00E+00	0.00E+00	0.00E+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
EEE	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
EET	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
Legend		CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electric energy; EET = Exported thermal energy							

3.3.3 Results of the product N 20

Table 19: Parameters to describe the impact assessment of the product N 20 per m² (ecoinvent 2.2)

Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
GWP process	kg CO_2 equiv	2.22E+01	1.49E+00	2.42E+01	0.00E+00	1.16E+00	2.41E+00	0.00E+00	2.07E+00
GWP C content	kg CO_2 equiv	-5.97E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.07E+01
GWP total	kg CO_2 equiv	-3.74E+01	1.49E+00	2.42E+01	0.00E+00	1.16E+00	2.41E+00	0.00E+00	4.28E+01
ODP	kg CFC-11 equiv	7.03E-07	2.36E-07	6.71E-07	0.00E+00	1.45E-07	3.81E-07	0.00E+00	6.19E-07
AP	kg SO_2 equiv	3.42E-02	5.71E-03	4.64E-02	0.00E+00	8.94E-03	9.22E-03	0.00E+00	1.23E-02
EP	kg PO_4^{3-} equiv	2.38E-02	1.52E-03	2.95E-02	0.00E+00	2.09E-03	2.46E-03	0.00E+00	3.01E-03
POCP	kg C_2H_4 equiv	6.84E-03	7.85E-04	7.38E-03	0.00E+00	1.06E-03	1.27E-03	0.00E+00	2.22E-03
ADPE	kg Sb equiv	8.43E-06	4.11E-06	1.31E-05	0.00E+00	1.84E-07	6.63E-06	0.00E+00	2.22E-06
ADPF	MJ H_u	1.28E+02	2.19E+01	1.42E+02	0.00E+00	1.60E+01	3.53E+01	0.00E+00	5.14E+01
Legend		GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources							

Table 20: Parameters to describe the resource use of the product N 20 per m² (ecoinvent 2.2)

Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
PERE	MJ H_u	1.79E+01	3.11E-01	9.64E+00	0.00E+00	6.47E-02	5.02E-01	0.00E+00	4.15E-01
PERM	MJ H_u	5.67E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ H_u	5.85E+02	3.11E-01	9.64E+00	0.00E+00	6.47E-02	5.02E-01	0.00E+00	4.15E-01
PENRE	MJ H_u	1.67E+02	2.31E+01	1.96E+02	0.00E+00	1.65E+01	3.73E+01	0.00E+00	5.40E+01
PENRM	MJ H_u	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 H_u	1.67E+02	2.31E+01	1.96E+02	0.00E+00	1.65E+01	3.73E+01	0.00E+00	5.40E+01
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 H_u	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 H_u	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	9.22E-02	8.47E-04	4.48E-02	0.00E+00	3.29E-04	1.37E-03	0.00E+00	5.49E-03
Legend		PERE = Renewable primary energy as energy carrier; PERM = Renewable primary energy resources as material utilisation; PERT = Total use of renewable primary energy resources; PENRE = Non-renewable primary energy as energy carrier; PENRM = Non-renewable primary energy as material utilisation; 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							

Table 21: Parameters to describe the waste categories of the product N 20 per m² (ecoinvent 2.2)

Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
HWD	kg	1.55E-04	2.32E-05	2.10E-04	0.00E+00	8.46E-06	3.74E-05	0.00E+00	2.12E-05
NHWD	kg	5.19E-01	1.45E-01	2.61E+00	0.00E+00	1.08E-02	2.35E-01	0.00E+00	2.91E+02
RWD	kg	2.90E-04	3.43E-05	5.86E-04	0.00E+00	8.47E-06	5.54E-05	0.00E+00	4.60E-05
Legend		HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed							

Table 22: Parameters to describe the potential of waste treatment and recovery in the end-of-life stage of the product N 20 per m² (ecoinvent 2.2)

Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
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	0.00E+00	0.00E+00	0.00E+00	0.00E+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
EEE	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
EET	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
Legend		CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electric energy; EET = Exported thermal energy							

3.3.4 Results of the product N 22

Table 23: Parameters to describe the impact assessment of the product N 22 per m² (ecoinvent 2.2)

Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
GWP process	kg CO_2 equiv	2.18E+01	1.46E+00	2.81E+01	0.00E+00	1.31E+00	2.70E+00	0.00E+00	2.32E+00
GWP C content	kg CO_2 equiv	-5.83E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.80E+01
GWP total	kg CO_2 equiv	-3.66E+01	1.46E+00	2.81E+01	0.00E+00	1.31E+00	2.70E+00	0.00E+00	4.04E+01
ODP	kg CFC-11 equiv	6.90E-07	2.31E-07	7.75E-07	0.00E+00	1.63E-07	4.28E-07	0.00E+00	6.96E-07
AP	kg SO_2 equiv	3.35E-02	5.59E-03	5.37E-02	0.00E+00	1.01E-02	1.04E-02	0.00E+00	1.38E-02
EP	kg PO_4^{3-} equiv	2.33E-02	1.49E-03	3.41E-02	0.00E+00	2.34E-03	2.76E-03	0.00E+00	3.38E-03
POCP	kg C_2H_4 equiv	6.69E-03	7.68E-04	8.52E-03	0.00E+00	1.19E-03	1.42E-03	0.00E+00	2.49E-03
ADPE	kg Sb equiv	8.25E-06	4.02E-06	1.52E-05	0.00E+00	2.07E-07	7.45E-06	0.00E+00	2.50E-06
ADPF	MJ H_u	1.26E+02	2.14E+01	1.64E+02	0.00E+00	1.80E+01	3.96E+01	0.00E+00	5.77E+01
Legend		GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources							

Table 24: Parameters to describe the resource use of the product N 22 per m² (ecoinvent 2.2)

Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
PERE	MJ H_u	1.76E+01	3.04E-01	1.12E+01	0.00E+00	7.27E-02	5.64E-01	0.00E+00	4.66E-01
PERM	MJ H_u	5.55E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ H_u	5.72E+02	3.04E-01	1.12E+01	0.00E+00	7.27E-02	5.64E-01	0.00E+00	4.66E-01
PENRE	MJ H_u	1.64E+02	2.26E+01	2.26E+02	0.00E+00	1.85E+01	4.19E+01	0.00E+00	6.07E+01
PENRM	MJ H_u	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 H_u	1.64E+02	2.26E+01	2.26E+02	0.00E+00	1.85E+01	4.19E+01	0.00E+00	6.07E+01
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 H_u	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 H_u	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	9.01E-02	8.28E-04	5.20E-02	0.00E+00	3.70E-04	1.54E-03	0.00E+00	6.17E-03
Legend		PERE = Renewable primary energy as energy carrier; PERM = Renewable primary energy resources as material utilisation; PERT = Total use of renewable primary energy resources; PENRE = Non-renewable primary energy as energy carrier; PENRM = Non-renewable primary energy as material utilisation; 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							

Table 25: Parameters to describe the waste categories of the product N 22 per m² (ecoinvent 2.2)

Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
HWD	kg	1.52E-04	2.27E-05	2.38E-04	0.00E+00	9.51E-06	4.20E-05	0.00E+00	2.38E-05
NHWD	kg	5.08E-01	1.42E-01	3.03E+00	0.00E+00	1.22E-02	2.64E-01	0.00E+00	3.27E+02
RWD	kg	2.84E-04	3.36E-05	6.78E-04	0.00E+00	9.51E-06	6.22E-05	0.00E+00	5.17E-05
Legend		HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed							

Table 26: Parameters to describe the potential of waste treatment and recovery in the end-of-life stage of the product N 22 per m² (ecoinvent 2.2)

Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
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	0.00E+00	0.00E+00	0.00E+00	0.00E+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
EEE	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
EET	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
Legend		CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electric energy; EET = Exported thermal energy							

3.3.5 Results of the product N 25

Table 27: Parameters to describe the impact assessment of the product N 25 per m² (ecoinvent 2.2)

Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
GWP process	kg CO_2 equiv	2.76E+01	1.87E+00	3.02E+01	0.00E+00	1.46E+00	3.01E+00	0.00E+00	2.59E+00
GWP C content	kg CO_2 equiv	-7.48E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.11E+01
GWP total	kg CO_2 equiv	-4.72E+01	1.87E+00	3.02E+01	0.00E+00	1.46E+00	3.01E+00	0.00E+00	5.37E+01
ODP	kg CFC-11 equiv	8.50E-07	2.96E-07	8.34E-07	0.00E+00	1.81E-07	4.76E-07	0.00E+00	7.75E-07
AP	kg SO_2 equiv	4.21E-02	7.17E-03	5.76E-02	0.00E+00	1.12E-02	1.15E-02	0.00E+00	1.54E-02
EP	kg PO_4^{3-} equiv	2.93E-02	1.91E-03	3.66E-02	0.00E+00	2.61E-03	3.07E-03	0.00E+00	3.76E-03
POCP	kg C_2H_4 equiv	8.48E-03	9.85E-04	9.14E-03	0.00E+00	1.32E-03	1.58E-03	0.00E+00	2.77E-03
ADPE	kg Sb equiv	1.05E-05	5.16E-06	1.63E-05	0.00E+00	2.31E-07	8.30E-06	0.00E+00	2.78E-06
ADPF	MJ H_u	1.56E+02	2.74E+01	1.76E+02	0.00E+00	2.00E+01	4.41E+01	0.00E+00	6.43E+01
Legend		GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources							

Table 28: Parameters to describe the resource use of the product N 25 per m² (ecoinvent 2.2)

Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
PERE	MJ H_u	2.13E+01	3.90E-01	1.20E+01	0.00E+00	8.09E-02	6.28E-01	0.00E+00	5.19E-01
PERM	MJ H_u	7.11E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ H_u	7.33E+02	3.90E-01	1.20E+01	0.00E+00	8.09E-02	6.28E-01	0.00E+00	5.19E-01
PENRE	MJ H_u	2.06E+02	2.90E+01	2.43E+02	0.00E+00	2.06E+01	4.67E+01	0.00E+00	6.75E+01
PENRM	MJ H_u	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 H_u	2.06E+02	2.90E+01	2.43E+02	0.00E+00	2.06E+01	4.67E+01	0.00E+00	6.75E+01
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 H_u	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 H_u	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	1.15E-01	1.06E-03	5.58E-02	0.00E+00	4.11E-04	1.71E-03	0.00E+00	6.86E-03
Legend		PERE = Renewable primary energy as energy carrier; PERM = Renewable primary energy resources as material utilisation; PERT = Total use of renewable primary energy resources; PENRE = Non-renewable primary energy as energy carrier; PENRM = Non-renewable primary energy as material utilisation; 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							

Table 29: Parameters to describe the waste categories of the product N 25 per m² (ecoinvent 2.2)

Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
HWD	kg	1.88E-04	2.91E-05	2.53E-04	0.00E+00	1.06E-05	4.68E-05	0.00E+00	2.65E-05
NHWD	kg	6.41E-01	1.82E-01	3.25E+00	0.00E+00	1.36E-02	2.94E-01	0.00E+00	3.64E+02
RWD	kg	3.53E-04	4.30E-05	7.28E-04	0.00E+00	1.06E-05	6.93E-05	0.00E+00	5.75E-05
Legend		HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed							

Table 30: Parameters to describe the potential of waste treatment and recovery in the end-of-life stage of the product N 25 per m² (ecoinvent 2.2)

Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
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	0.00E+00	0.00E+00	0.00E+00	0.00E+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
EEE	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
EET	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
Legend		CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electric energy; EET = Exported thermal energy							

3.3.6 Results of the product I 25

Table 31: Parameters to describe the impact assessment of the product I 25 per m² (ecoinvent 2.2)

Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
GWP process	kg CO_2 equiv	2.75E+01	1.86E+00	3.38E+01	0.00E+00	1.60E+00	3.30E+00	0.00E+00	2.83E+00
GWP C content	kg CO_2 equiv	-7.46E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.95E+01
GWP total	kg CO_2 equiv	-4.71E+01	1.86E+00	3.38E+01	0.00E+00	1.60E+00	3.30E+00	0.00E+00	5.23E+01
ODP	kg CFC-11 equiv	8.49E-07	2.95E-07	9.32E-07	0.00E+00	1.99E-07	5.22E-07	0.00E+00	8.49E-07
AP	kg SO_2 equiv	4.20E-02	7.15E-03	6.45E-02	0.00E+00	1.23E-02	1.26E-02	0.00E+00	1.68E-02
EP	kg PO_4^{3-} equiv	2.93E-02	1.91E-03	4.10E-02	0.00E+00	2.86E-03	3.37E-03	0.00E+00	4.12E-03
POCP	kg C_2H_4 equiv	8.45E-03	9.82E-04	1.02E-02	0.00E+00	1.45E-03	1.74E-03	0.00E+00	3.04E-03
ADPE	kg Sb equiv	1.05E-05	5.14E-06	1.83E-05	0.00E+00	2.53E-07	9.09E-06	0.00E+00	3.05E-06
ADPF	MJ H_u	1.56E+02	2.73E+01	1.96E+02	0.00E+00	2.19E+01	4.83E+01	0.00E+00	7.05E+01
Legend		GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources							

Table 32: Parameters to describe the resource use of the product I 25 per m² (ecoinvent 2.2)

Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
PERE	MJ H_u	2.13E+01	3.89E-01	1.35E+01	0.00E+00	8.87E-02	6.88E-01	0.00E+00	5.69E-01
PERM	MJ H_u	7.10E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ H_u	7.31E+02	3.89E-01	1.35E+01	0.00E+00	8.87E-02	6.88E-01	0.00E+00	5.69E-01
PENRE	MJ H_u	2.05E+02	2.89E+01	2.72E+02	0.00E+00	2.26E+01	5.11E+01	0.00E+00	7.40E+01
PENRM	MJ H_u	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 H_u	2.05E+02	2.89E+01	2.72E+02	0.00E+00	2.26E+01	5.11E+01	0.00E+00	7.40E+01
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 H_u	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 H_u	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	1.15E-01	1.06E-03	6.26E-02	0.00E+00	4.51E-04	1.87E-03	0.00E+00	7.52E-03
Legend		PERE = Renewable primary energy as energy carrier; PERM = Renewable primary energy resources as material utilisation; PERT = Total use of renewable primary energy resources; PENRE = Non-renewable primary energy as energy carrier; PENRM = Non-renewable primary energy as material utilisation; 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							

Table 33: Parameters to describe the waste categories of the product I 25 per m² (ecoinvent 2.2)

Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
HWD	kg	1.88E-04	2.90E-05	2.80E-04	0.00E+00	1.16E-05	5.13E-05	0.00E+00	2.90E-05
NHWD	kg	6.40E-01	1.82E-01	3.64E+00	0.00E+00	1.49E-02	3.22E-01	0.00E+00	3.99E+02
RWD	kg	3.52E-04	4.29E-05	8.15E-04	0.00E+00	1.16E-05	7.59E-05	0.00E+00	6.31E-05
Legend		HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed							

Table 34: Parameters to describe the potential of waste treatment and recovery in the end-of-life stage of the product I 25 per m² (ecoinvent 2.2)

Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
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	0.00E+00	0.00E+00	0.00E+00	0.00E+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
EEE	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
EET	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
Legend		CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electric energy; EET = Exported thermal energy							

3.3.7 Results of the product I 30

Table 35: Parameters to describe the impact assessment of the product I 30 per m² (ecoinvent 2.2)

Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
GWP process	kg CO_2 equiv	2.90E+01	1.97E+00	4.25E+01	0.00E+00	1.95E+00	4.02E+00	0.00E+00	3.46E+00
GWP C content	kg CO_2 equiv	-7.89E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.96E+01
GWP total	kg CO_2 equiv	-4.98E+01	1.97E+00	4.25E+01	0.00E+00	1.95E+00	4.02E+00	0.00E+00	5.31E+01
ODP	kg CFC-11 equiv	8.90E-07	3.12E-07	1.17E-06	0.00E+00	2.43E-07	6.37E-07	0.00E+00	1.04E-06
AP	kg SO_2 equiv	4.42E-02	7.55E-03	8.07E-02	0.00E+00	1.50E-02	1.54E-02	0.00E+00	2.05E-02
EP	kg PO_4^{3-} equiv	3.08E-02	2.01E-03	5.13E-02	0.00E+00	3.49E-03	4.11E-03	0.00E+00	5.03E-03
POCP	kg C_2H_4 equiv	8.91E-03	1.04E-03	1.28E-02	0.00E+00	1.77E-03	2.12E-03	0.00E+00	3.71E-03
ADPE	kg Sb equiv	1.10E-05	5.43E-06	2.29E-05	0.00E+00	3.09E-07	1.11E-05	0.00E+00	3.72E-06
ADPF	MJ H_u	1.64E+02	2.89E+01	2.45E+02	0.00E+00	2.68E+01	5.90E+01	0.00E+00	8.60E+01
Legend		GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources							

Table 36: Parameters to describe the resource use of the product I 30 per m² (ecoinvent 2.2)

Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
PERE	MJ H_u	2.22E+01	4.11E-01	1.69E+01	0.00E+00	1.08E-01	8.40E-01	0.00E+00	6.95E-01
PERM	MJ H_u	7.50E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ H_u	7.72E+02	4.11E-01	1.69E+01	0.00E+00	1.08E-01	8.40E-01	0.00E+00	6.95E-01
PENRE	MJ H_u	2.16E+02	3.06E+01	3.40E+02	0.00E+00	2.76E+01	6.24E+01	0.00E+00	9.04E+01
PENRM	MJ H_u	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 H_u	2.16E+02	3.06E+01	3.40E+02	0.00E+00	2.76E+01	6.24E+01	0.00E+00	9.04E+01
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 H_u	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 H_u	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	1.21E-01	1.12E-03	7.87E-02	0.00E+00	5.50E-04	2.29E-03	0.00E+00	9.18E-03
Legend		PERE = Renewable primary energy as energy carrier; PERM = Renewable primary energy resources as material utilisation; PERT = Total use of renewable primary energy resources; PENRE = Non-renewable primary energy as energy carrier; PENRM = Non-renewable primary energy as material utilisation; 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							

Table 37: Parameters to describe the waste categories of the product I 30 per m² (ecoinvent 2.2)

Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
HWD	kg	1.97E-04	3.06E-05	3.42E-04	0.00E+00	1.42E-05	6.26E-05	0.00E+00	3.54E-05
NHWD	kg	6.74E-01	1.92E-01	4.57E+00	0.00E+00	1.82E-02	3.93E-01	0.00E+00	4.87E+02
RWD	kg	3.69E-04	4.54E-05	1.02E-03	0.00E+00	1.42E-05	9.27E-05	0.00E+00	7.70E-05
Legend		HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed							

Table 38: Parameters to describe the potential of waste treatment and recovery in the end-of-life stage of the product I 30 per m² (ecoinvent 2.2)

Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
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	0.00E+00	0.00E+00	0.00E+00	0.00E+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
EEE	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
EET	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
Legend		CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electric energy; EET = Exported thermal energy							

3.3.8 Results of the product TW 30

Table 39: Parameters to describe the impact assessment of the product TW 30 per m² (ecoinvent 2.2)

Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
GWP process	kg CO_2 equiv	3.69E+01	2.53E+00	3.54E+01	0.00E+00	1.77E+00	3.65E+00	0.00E+00	3.14E+00
GWP C content	kg CO_2 equiv	-1.01E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.11E+01
GWP total	kg CO_2 equiv	-6.42E+01	2.53E+00	3.54E+01	0.00E+00	1.77E+00	3.65E+00	0.00E+00	7.42E+01
ODP	kg CFC-11 equiv	1.11E-06	4.00E-07	9.81E-07	0.00E+00	2.20E-07	5.78E-07	0.00E+00	9.40E-07
AP	kg SO_2 equiv	5.58E-02	9.68E-03	6.76E-02	0.00E+00	1.36E-02	1.40E-02	0.00E+00	1.86E-02
EP	kg PO_4^{3-} equiv	3.89E-02	2.58E-03	4.29E-02	0.00E+00	3.17E-03	3.73E-03	0.00E+00	4.57E-03
POCP	kg C_2H_4 equiv	1.13E-02	1.33E-03	1.07E-02	0.00E+00	1.61E-03	1.92E-03	0.00E+00	3.37E-03
ADPE	kg Sb equiv	1.41E-05	6.97E-06	1.92E-05	0.00E+00	2.80E-07	1.01E-05	0.00E+00	3.38E-06
ADPF	MJ H_u	2.05E+02	3.70E+01	2.06E+02	0.00E+00	2.43E+01	5.36E+01	0.00E+00	7.80E+01
Legend		GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources							

Table 40: Parameters to describe the resource use of the product TW 30 per m² (ecoinvent 2.2)

Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
PERE	MJ H_u	2.73E+01	5.27E-01	1.41E+01	0.00E+00	9.82E-02	7.62E-01	0.00E+00	6.30E-01
PERM	MJ H_u	9.61E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ H_u	9.89E+02	5.27E-01	1.41E+01	0.00E+00	9.82E-02	7.62E-01	0.00E+00	6.30E-01
PENRE	MJ H_u	2.73E+02	3.92E+01	2.85E+02	0.00E+00	2.50E+01	5.66E+01	0.00E+00	8.20E+01
PENRM	MJ H_u	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 H_u	2.73E+02	3.92E+01	2.85E+02	0.00E+00	2.50E+01	5.66E+01	0.00E+00	8.20E+01
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 H_u	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 H_u	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	1.55E-01	1.44E-03	6.56E-02	0.00E+00	5.00E-04	2.08E-03	0.00E+00	8.33E-03
Legend		PERE = Renewable primary energy as energy carrier; PERM = Renewable primary energy resources as material utilisation; PERT = Total use of renewable primary energy resources; PENRE = Non-renewable primary energy as energy carrier; PENRM = Non-renewable primary energy as material utilisation; 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							

Table 41: Parameters to describe the waste categories of the product TW 30 per m² (ecoinvent 2.2)

Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
HWD	kg	2.45E-04	3.93E-05	2.92E-04	0.00E+00	1.29E-05	5.68E-05	0.00E+00	3.21E-05
NHWD	kg	8.54E-01	2.46E-01	3.81E+00	0.00E+00	1.65E-02	3.56E-01	0.00E+00	4.42E+02
RWD	kg	4.62E-04	5.82E-05	8.54E-04	0.00E+00	1.29E-05	8.41E-05	0.00E+00	6.98E-05
Legend		HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed							

Table 42: Parameters to describe the potential of waste treatment and recovery in the end-of-life stage of the product TW 30 per m² (ecoinvent 2.2)

Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
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	0.00E+00	0.00E+00	0.00E+00	0.00E+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
EEE	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
EET	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
Legend		CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electric energy; EET = Exported thermal energy							

3.4 Interpretation of the LCA results

3.4.1 Life cycle assessment results of the product N 15

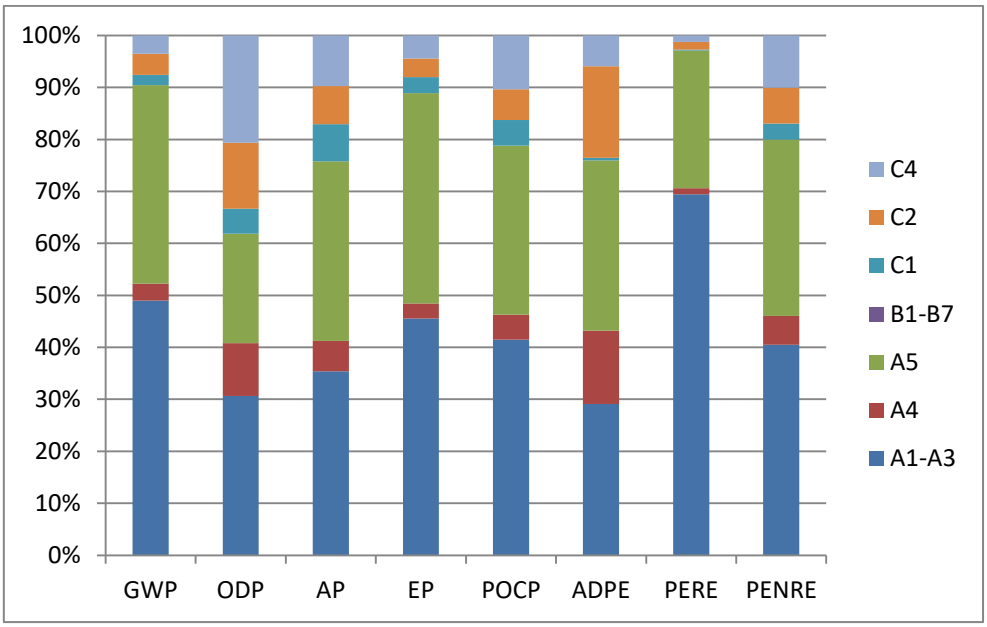


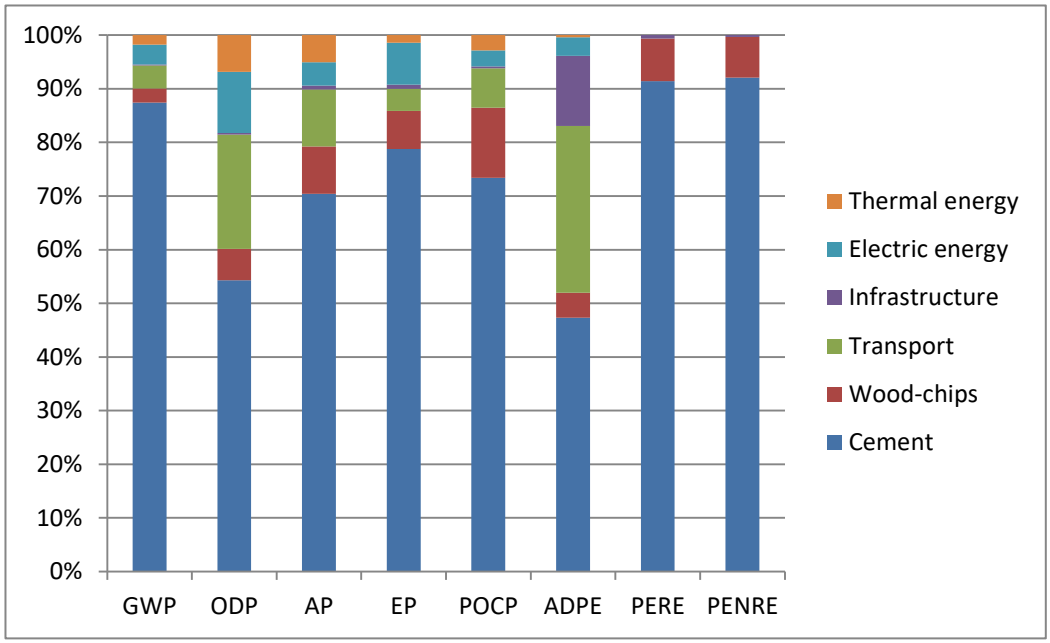
Figure 2: Shares of the individual life cycle stages in the total life cycle assessment of the product N 15 in selected impact indicators

Legend

GWP = Global warming potential (without consideration of the CO_2 storage of wood and the carbonation of the concrete at the landfill); ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone; ADPE = Abiotic depletion potential for non-fossil resources; PERE = Renewable primary energy as energy carrier; PENRE = Non-renewable primary energy as energy carrier

Examining the ecological indicators over the entire life cycle illustrates that on average around 40% of the loads in the different impact categories come from the stages A1-A3. The effects of the installation stage (A5) are, depending on the category, roughly 20-40%. The demolition of the building and the disposal of the declared product play a lesser role.

Figure 3: Shares of loads of the product N 15 during the product stage (A1-A3)

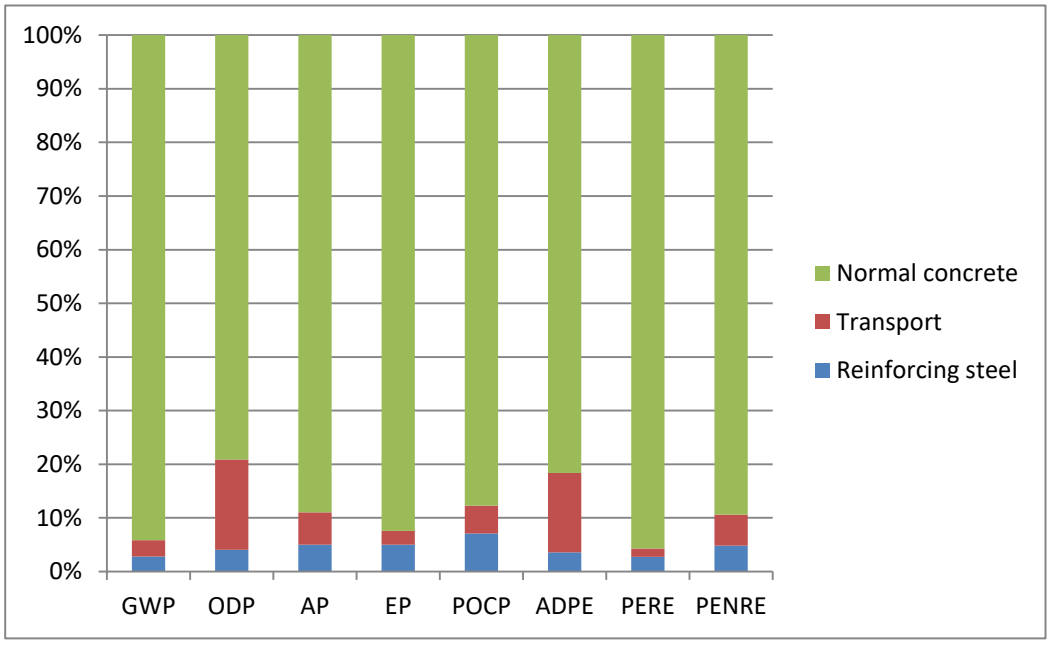


Legend

GWP = Global warming potential (without consideration of the CO_2 storage of wood); ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential;
POCP = Formation potential of tropospheric ozone; ADPE = Abiotic depletion potential for non-fossil resources; PERE = Renewable primary energy as energy carrier; PENRE = Non-renewable primary energy as energy carrier

In the product stage the ecological effects are mainly caused by the production of the used cement. The transport of the substances has a significant effect only in the categories ozone depletion potential and abiotic depletion potential. The energy input required to manufacture the declared product hardly plays a role in the life cycle assessment.

Figure 4: Shares of loads of the product N 15 during the installation stage (A5)



Legend

GWP = Global warming potential (without consideration of the CO_2 storage); ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone; ADPE = Abiotic depletion potential for non-fossil resources; PERE = Renewable primary energy as energy carrier; PENRE = Non-renewable primary energy as energy carrier

The loads in the installation stage are nearly entirely caused by the production of the filling concrete. A small part comes from the transport of the blocks from the manufacturer to the building site and from the transport of the filling concrete from the concrete plant to the building site.

3.4.2 Life cycle assessment results of the product N 18

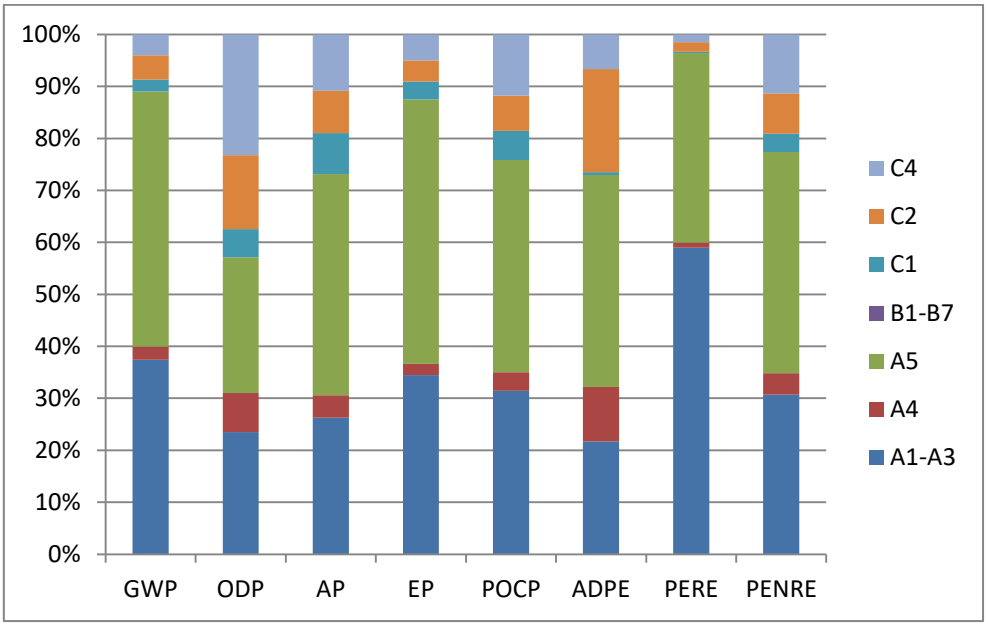


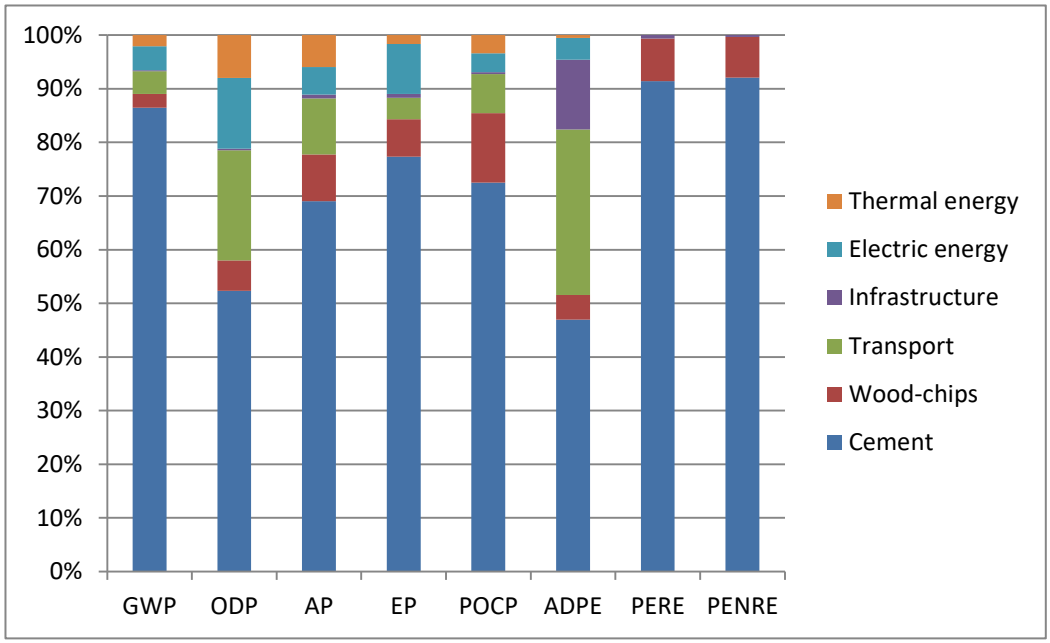
Figure 5: Shares of the individual life cycle stages in the total life cycle assessment of the product N 18 in selected impact indicators

Legend

GWP = Global warming potential (without consideration of the CO_2 storage of wood and the carbonation of the concrete at the landfill); ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone; ADPE = Abiotic depletion potential for non-fossil resources; PERE = Renewable primary energy as energy carrier; PENRE = Non-renewable primary energy as energy carrier

Examining the ecological indicators over the entire life cycle illustrates that on average around 30% of the loads in the different impact categories come from the stages A1-A3. The effects of the installation stage (A5) are, depending on the category, roughly 25-45%. The demolition of the building plays a lesser role. The loads at the landfill contribute around 5-20% to the overall life cycle assessment.

Figure 6: Shares of loads of the product N 18 during the product stage (A1-A3)

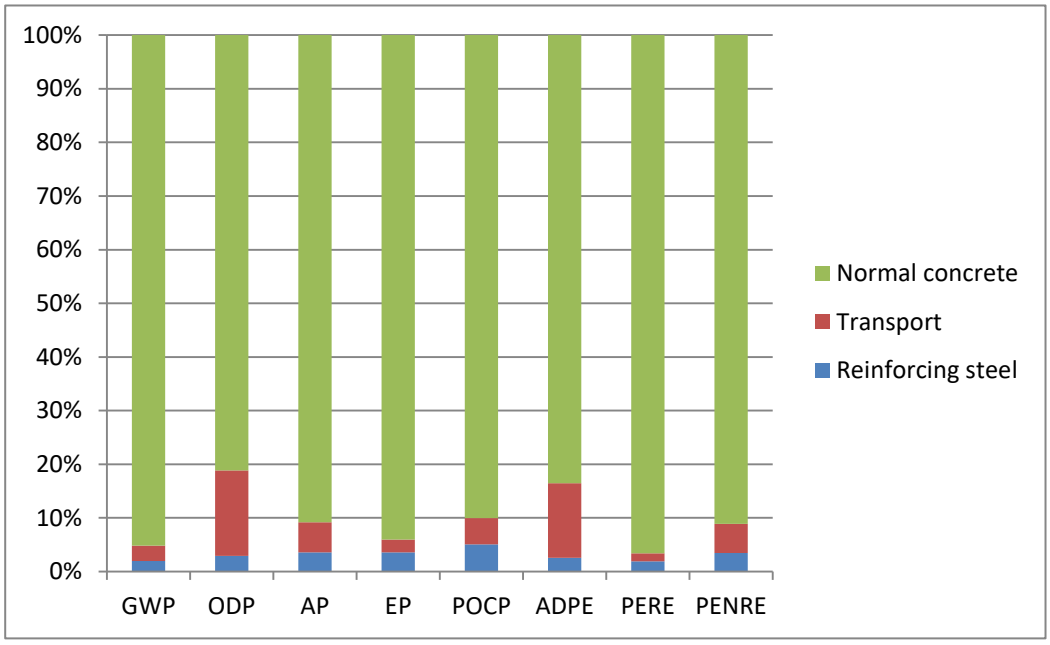


Legend

GWP = Global warming potential (without consideration of the CO_2 storage of wood); ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential;
POCP = Formation potential of tropospheric ozone; ADPE = Abiotic depletion potential for non-fossil resources; PERE = Renewable primary energy as energy carrier; PENRE = Non-renewable primary energy as energy carrier

In the product stage the ecological effects are mainly caused by the production of the used cement. The transport of the substances has a significant effect only in the categories ozone depletion potential and abiotic depletion potential. The energy input required to manufacture the declared product hardly plays a role in the life cycle assessment.

Figure 7: Shares of loads of the product N 18 during the installation stage (A5)



Legend

GWP = Global warming potential (without consideration of the CO_2 storage); ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone; ADPE = Abiotic depletion potential for non-fossil resources; PERE = Renewable primary energy as energy carrier; PENRE = Non-renewable primary energy as energy carrier

The loads in the installation stage are nearly entirely caused by the production of the filling concrete. A small part comes from the transport of the blocks from the manufacturer to the building site and from the transport of the filling concrete from the concrete plant to the building site.

3.4.3 Life cycle assessment results of the product N 20

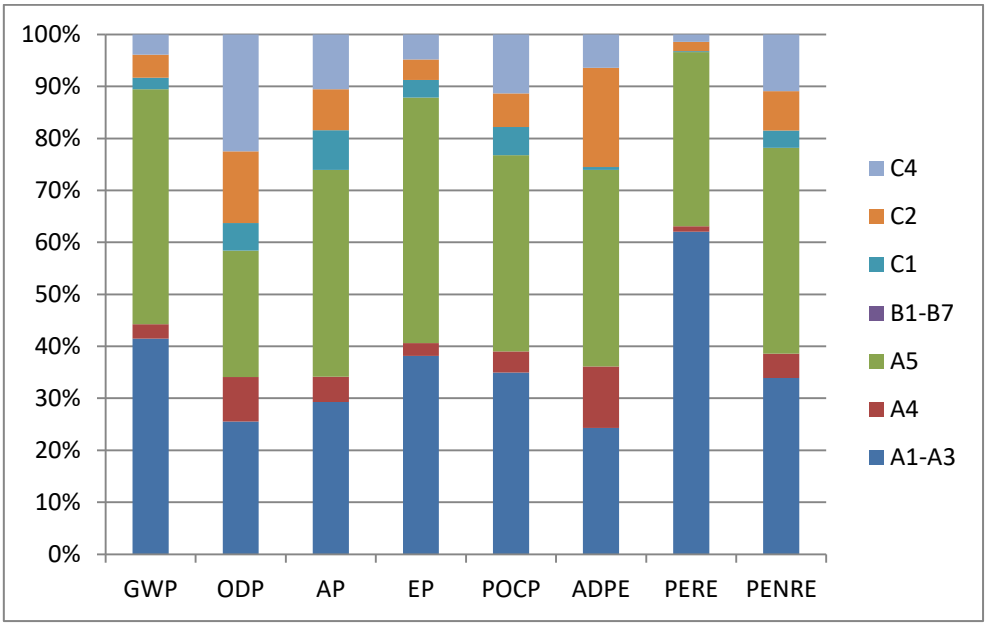


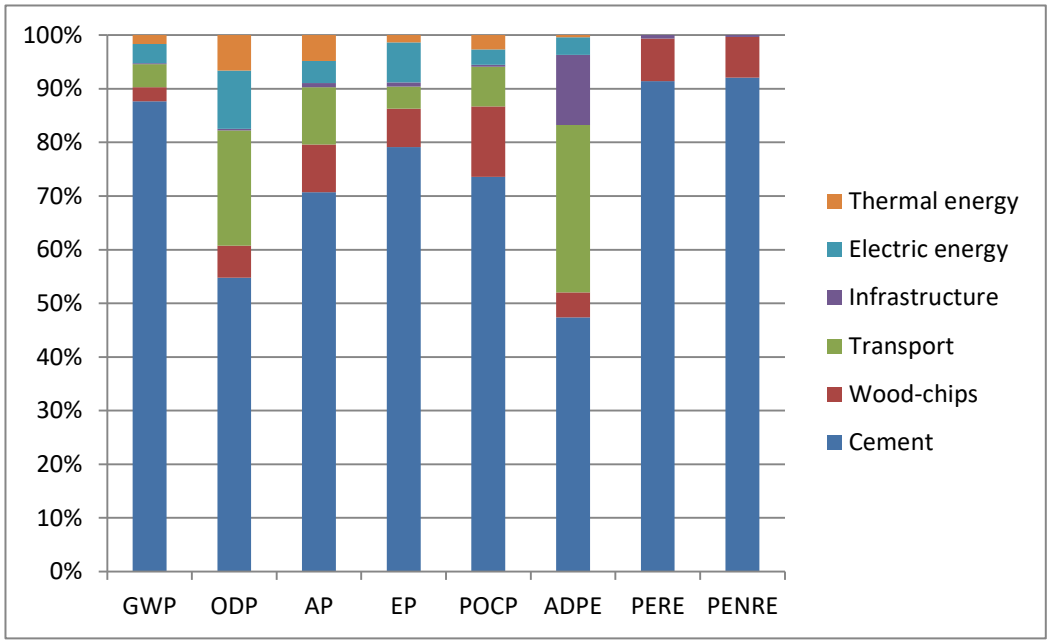
Figure 8: Shares of the individual life cycle stages in the total life cycle assessment of the product N 20 in selected impact indicators

Legend

GWP = Global warming potential (without consideration of the CO_2 storage of wood and the carbonation of the concrete at the landfill); ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone; ADPE = Abiotic depletion potential for non-fossil resources; PERE = Renewable primary energy as energy carrier; PENRE = Non-renewable primary energy as energy carrier

Examining the ecological indicators over the entire life cycle illustrates that, on account of the larger concrete volume, the production of the filling concrete has the biggest effects on the life cycle assessment in most categories. On average around 35% comes from the stage A1-A3. The demolition of the building plays a lesser role. The loads at the landfill contribute up to 20% to the overall life cycle assessment.

Figure 9: Shares of loads of the product N 20 during the product stage (A1-A3)

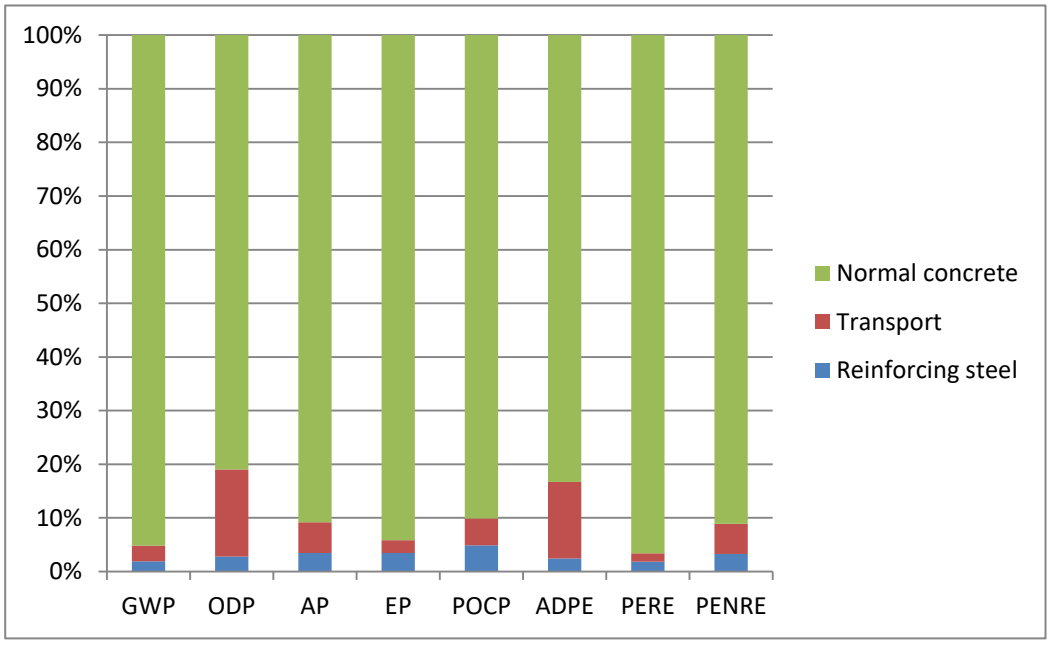


Legend

GWP = Global warming potential (without consideration of the CO_2 storage of wood); ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential;
POCP = Formation potential of tropospheric ozone; ADPE = Abiotic depletion potential for non-fossil resources; PERE = Renewable primary energy as energy carrier; PENRE = Non-renewable primary energy as energy carrier

In the product stage the ecological effects are mainly caused by the production of the used cement. The transport of the substances has a significant effect only in the categories ozone depletion potential and abiotic depletion potential. The energy input required to manufacture the declared product hardly plays a role in the life cycle assessment.

Figure 10: Shares of loads of the product N 20 during the installation stage (A5)



Legend GWP = Global warming potential (without consideration of the CO_2 storage); ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone; ADPE = Abiotic depletion potential for non-fossil resources; PERE = Renewable primary energy as energy carrier; PENRE = Non-renewable primary energy as energy carrier

The loads in the installation stage are nearly entirely caused by the production of the filling concrete. A small part comes from the transport of the blocks from the manufacturer to the building site and from the transport of the filling concrete from the concrete plant to the building site.

3.4.4 Life cycle assessment results of the product N 22

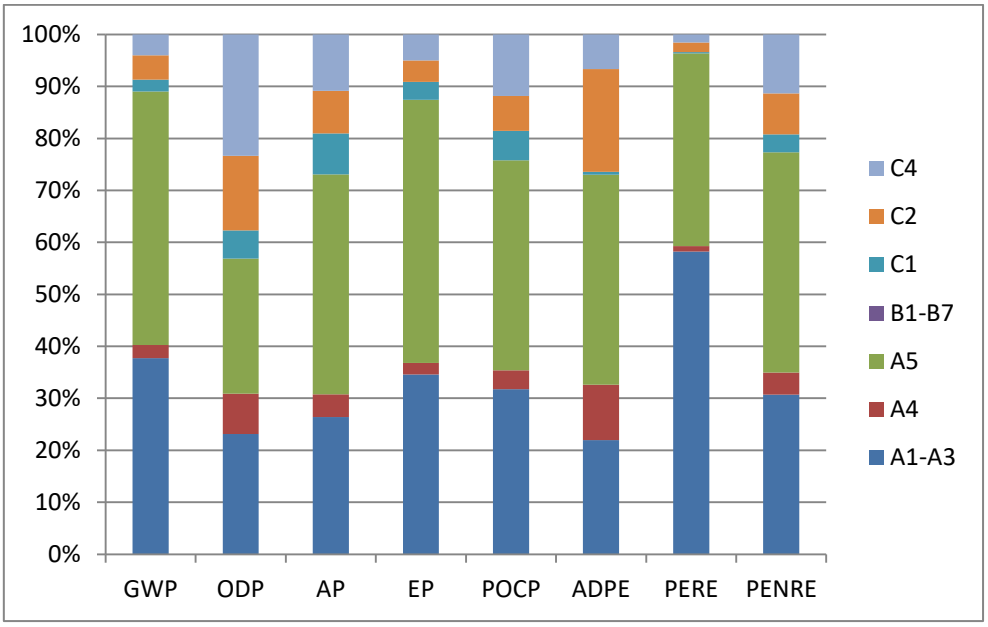


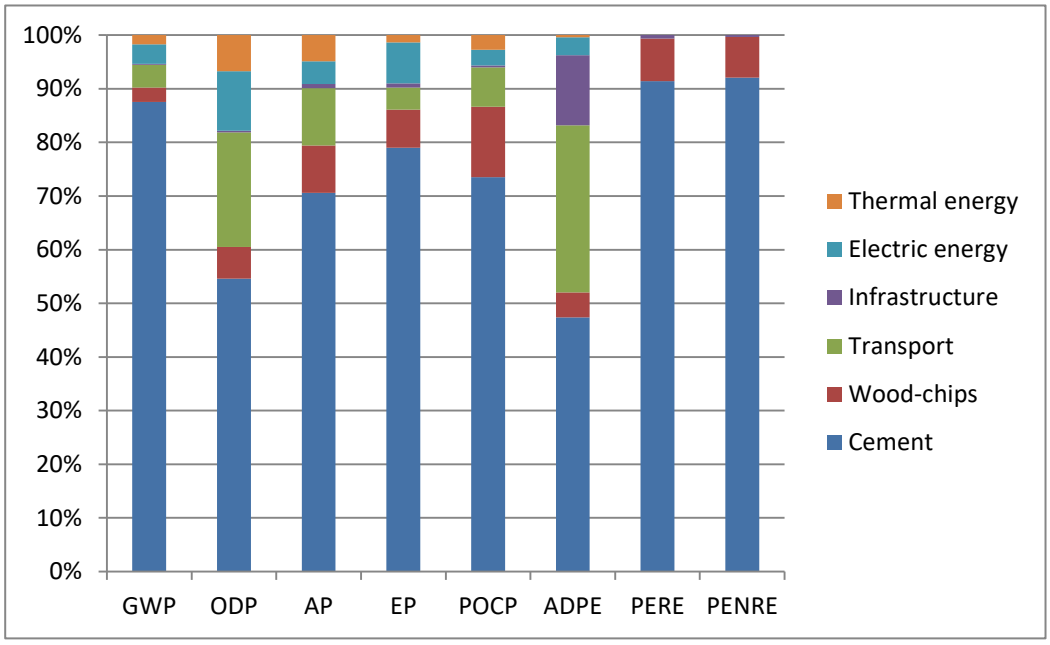
Figure 11: Shares of the individual life cycle stages in the total life cycle assessment of the product N 22 in selected impact indicators

Legend

GWP = Global warming potential (without consideration of the CO_2 storage of wood and the carbonation of the concrete at the landfill); ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone; ADPE = Abiotic depletion potential for non-fossil resources; PERE = Renewable primary energy as energy carrier; PENRE = Non-renewable primary energy as energy carrier

Examining the ecological indicators over the entire life cycle illustrates that, on account of the high concrete volume, the production of the filling concrete has the biggest effects on the life cycle assessment in most categories. On average around 30% comes from the stage A1-A3. The demolition of the building plays a lesser role. The loads at the landfill contribute up to 20% to the overall life cycle assessment.

Figure 12: Shares of loads of the product N 22 during the product stage (A1-A3)

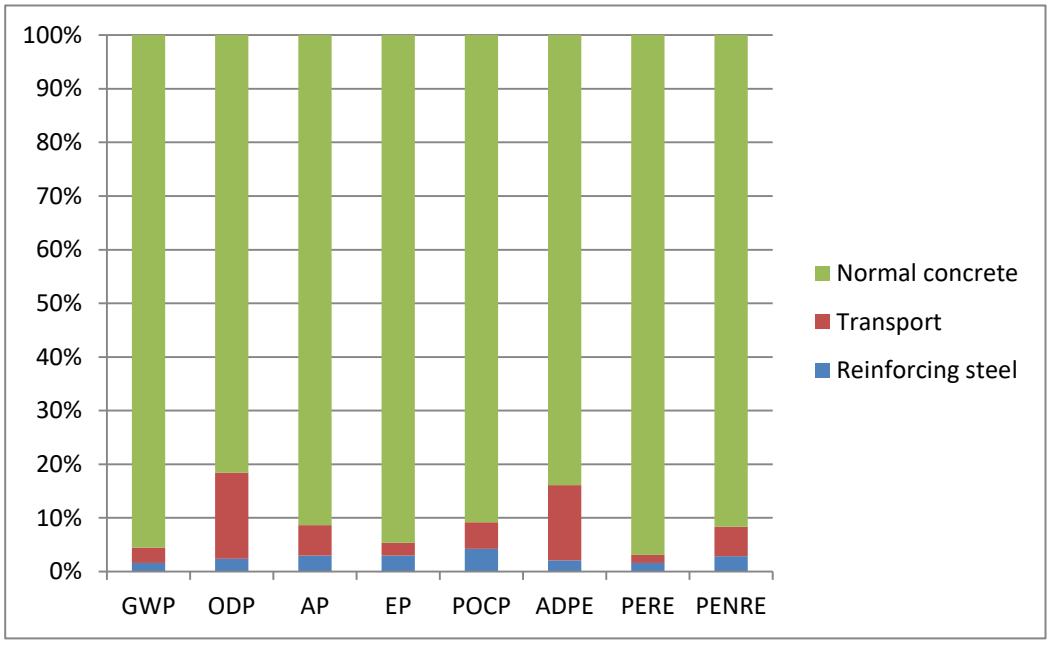


Legend

GWP = Global warming potential (without consideration of the CO_2 storage of wood); ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential;
POCP = Formation potential of tropospheric ozone; ADPE = Abiotic depletion potential for non-fossil resources; PERE = Renewable primary energy as energy carrier; PENRE = Non-renewable primary energy as energy carrier

In the product stage the ecological effects are mainly caused by the production of the used cement. The transport of the substances has a significant effect only in the categories ozone depletion potential and abiotic depletion potential. The energy input required to manufacture the declared product hardly plays a role in the life cycle assessment.

Figure 13: Shares of loads of the product N 22 during the installation stage (A5)



Legend

GWP = Global warming potential (without consideration of the CO_2 storage); ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone; ADPE = Abiotic depletion potential for non-fossil resources; PERE = Renewable primary energy as energy carrier; PENRE = Non-renewable primary energy as energy carrier

The loads in the installation stage are nearly entirely caused by the production of the filling concrete. A small part comes from the transport of the blocks from the manufacturer to the building site and from the transport of the filling concrete from the concrete plant to the building site.

3.4.5 Life cycle assessment results of the product N 25

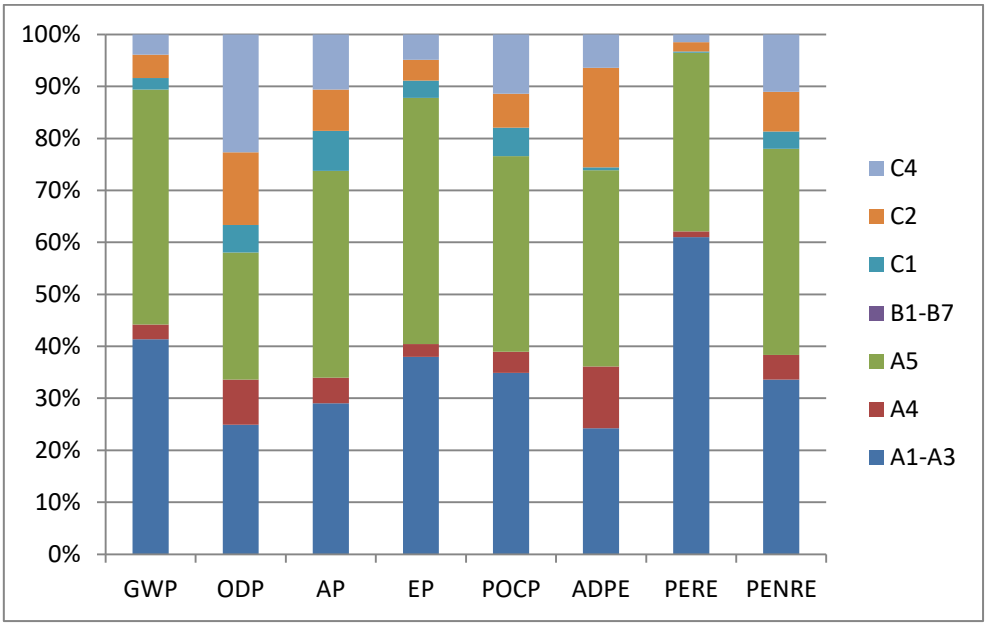


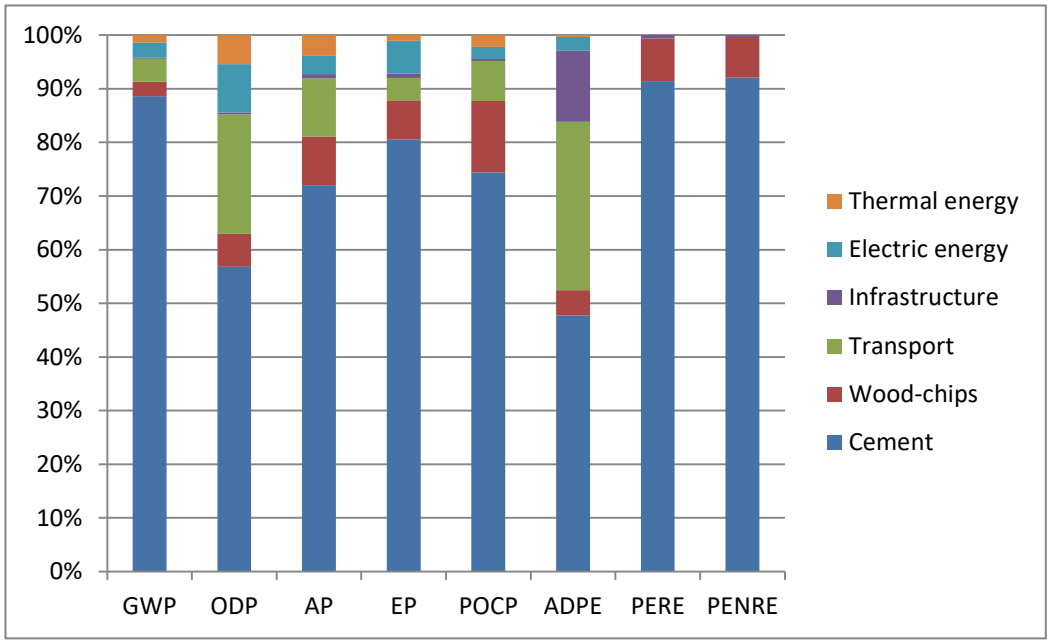
Figure 14: Shares of the individual life cycle stages in the total life cycle assessment of the product N 25 in selected impact indicators

Legend

GWP = Global warming potential (without consideration of the CO_2 storage of wood and the carbonation of the concrete at the landfill); ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone; ADPE = Abiotic depletion potential for non-fossil resources; PERE = Renewable primary energy as energy carrier; PENRE = Non-renewable primary energy as energy carrier

Examining the ecological indicators over the entire life cycle illustrates that, on account of the high concrete volume, the production of the filling concrete has the biggest effects on the life cycle assessment in most categories. On average around 30% comes from the stage A1-A3. The demolition of the building plays a lesser role. The loads at the landfill contribute up to 20% to the overall life cycle assessment.

Figure 15: Shares of loads of the product N 25 during the product stage (A1-A3)

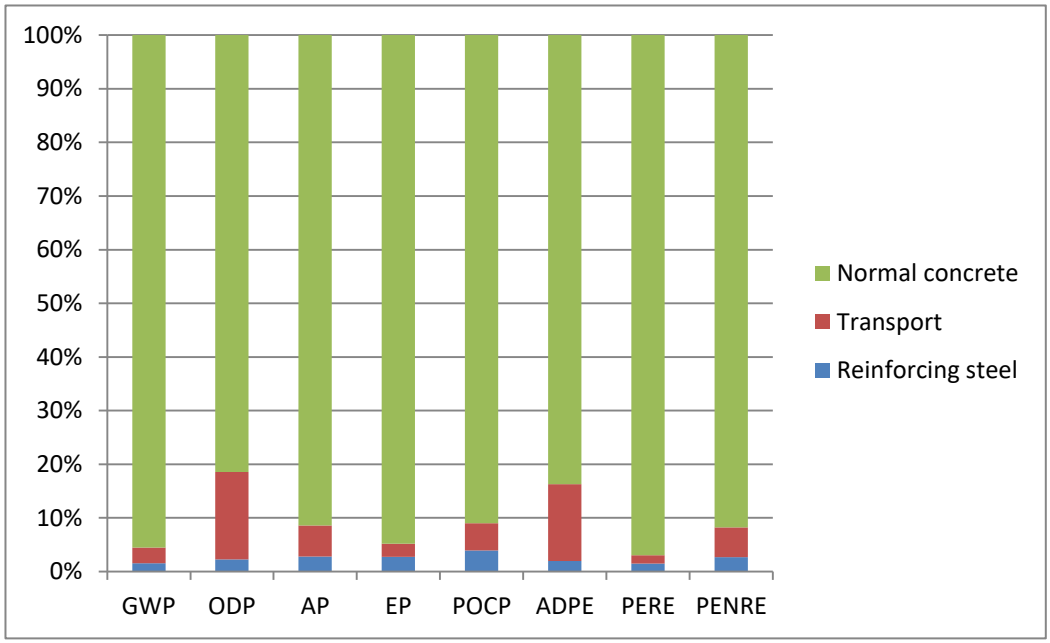


Legend

GWP = Global warming potential (without consideration of the CO_2 storage of wood); ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential;
POCP = Formation potential of tropospheric ozone; ADPE = Abiotic depletion potential for non-fossil resources; PERE = Renewable primary energy as energy carrier; PENRE = Non-renewable primary energy as energy carrier

In the product stage the ecological effects are mainly caused by the production of the used cement. The transport of the substances has a significant effect only in the categories ozone depletion potential and abiotic depletion potential. The energy input required to manufacture the declared product hardly plays a role in the life cycle assessment.

Figure 16: Shares of loads of the product N 25 during the installation stage (A5)



Legend

GWP = Global warming potential (without consideration of the CO_2 storage); ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone; ADPE = Abiotic depletion potential for non-fossil resources; PERE = Renewable primary energy as energy carrier; PENRE = Non-renewable primary energy as energy carrier

The loads in the installation stage are nearly entirely caused by the production of the filling concrete. A small part comes from the transport of the blocks from the manufacturer to the building site and from the transport of the filling concrete from the concrete plant to the building site.

3.4.6 Life cycle assessment results of the product I 25

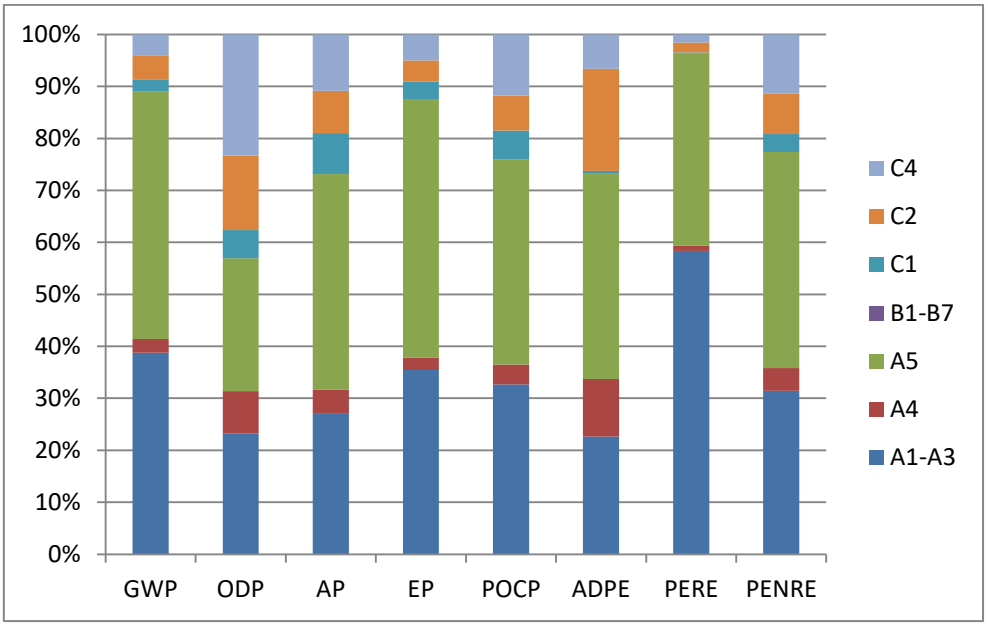


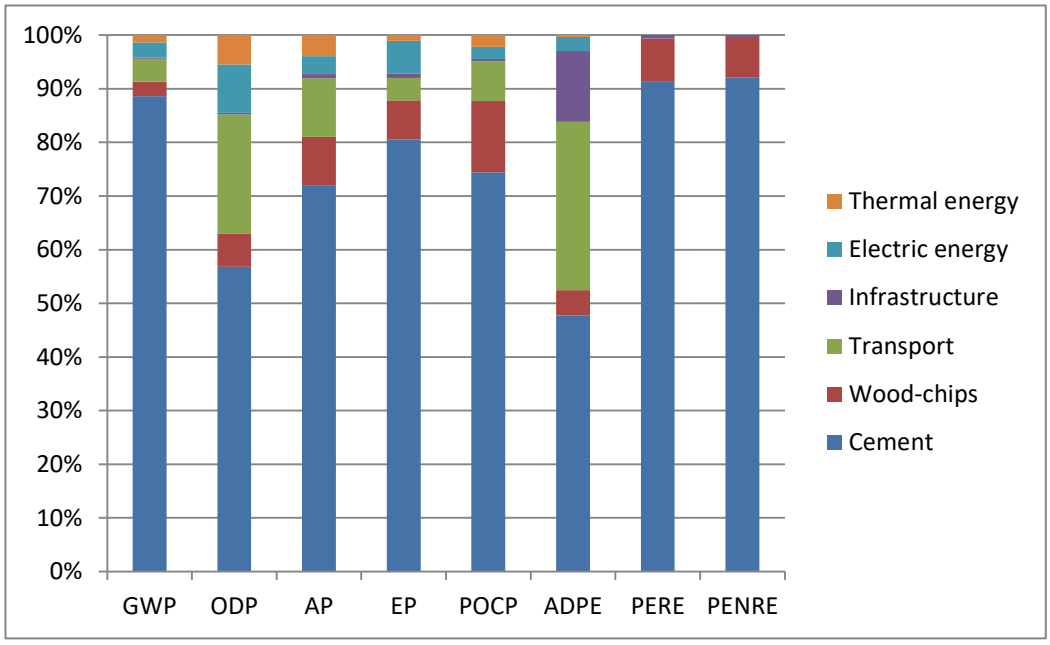
Figure 17: Shares of the individual life cycle stages in the total life cycle assessment of the product I 25 in selected impact indicators

Legend

GWP = Global warming potential (without consideration of the CO_2 storage of wood and the carbonation of the concrete at the landfill); ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone; ADPE = Abiotic depletion potential for non-fossil resources; PERE = Renewable primary energy as energy carrier; PENRE = Non-renewable primary energy as energy carrier

Examining the ecological indicators over the entire life cycle illustrates that, on account of the high concrete volume, the production of the filling concrete has the biggest effects on the life cycle assessment in most categories. On average around 30% comes from the stage A1-A3. The demolition of the building plays a lesser role. The loads at the landfill contribute up to 20% to the overall life cycle assessment.

Figure 18: Shares of loads of the product I 25 during the product stage (A1-A3)

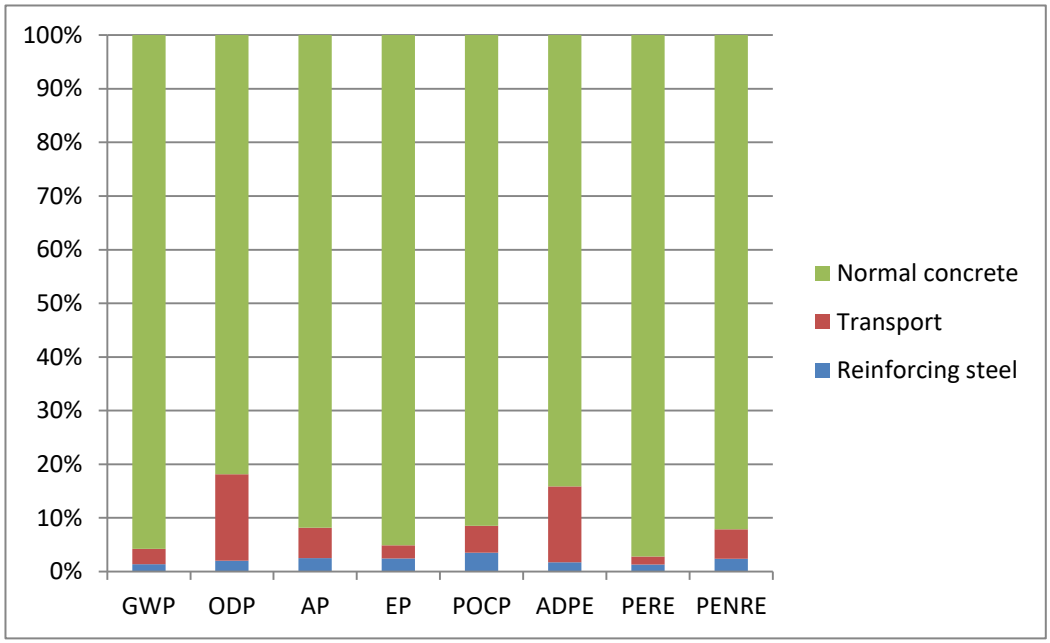


Legend

GWP = Global warming potential (without consideration of the CO_2 storage of wood); ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential;
POCP = Formation potential of tropospheric ozone; ADPE = Abiotic depletion potential for non-fossil resources; PERE = Renewable primary energy as energy carrier; PENRE = Non-renewable primary energy as energy carrier

In the product stage the ecological effects are mainly caused by the production of the used cement. The transport of the substances has a significant effect only in the categories ozone depletion potential and abiotic depletion potential. The energy input required to manufacture the declared product hardly plays a role in the life cycle assessment.

Figure 19: Shares of loads of the product I 25 during the installation stage (A5)



Legend

GWP = Global warming potential (without consideration of the CO_2 storage); ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone; ADPE = Abiotic depletion potential for non-fossil resources; PERE = Renewable primary energy as energy carrier; PENRE = Non-renewable primary energy as energy carrier

The loads in the installation stage are nearly entirely caused by the production of the filling concrete. A small part comes from the transport of the blocks from the manufacturer to the building site and from the transport of the filling concrete from the concrete plant to the building site.

3.4.7 Life cycle assessment results of the product I 30

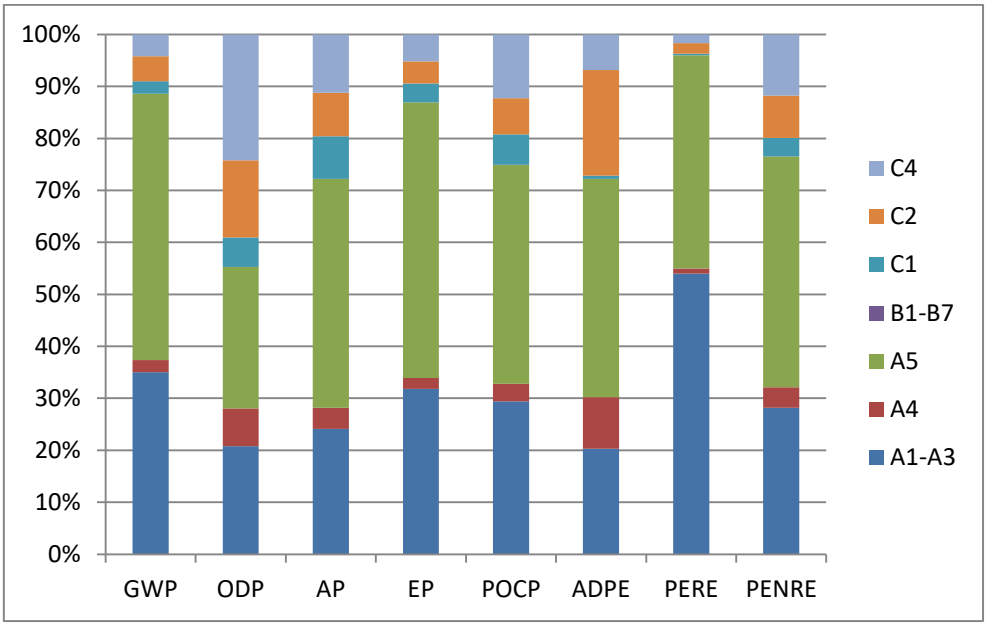


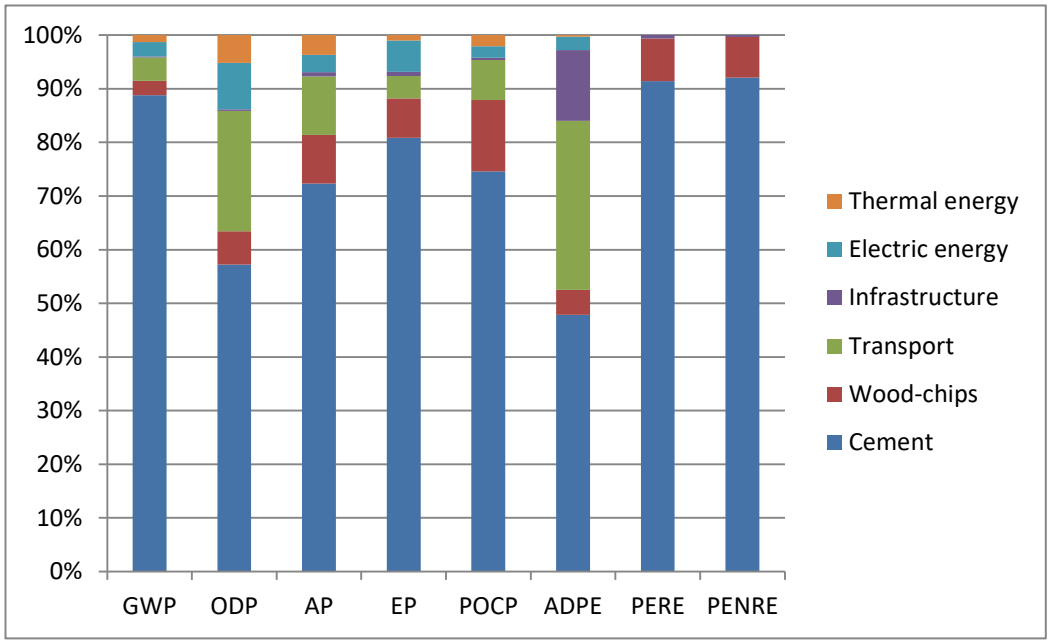
Figure 20: Shares of the individual life cycle stages in the total life cycle assessment of the product I 30 in selected impact indicators

Legend

GWP = Global warming potential (without consideration of the CO_2 storage of wood and the carbonation of the concrete at the landfill); ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone; ADPE = Abiotic depletion potential for non-fossil resources; PERE = Renewable primary energy as energy carrier; PENRE = Non-renewable primary energy as energy carrier

Examining the ecological indicators over the entire life cycle illustrates that, on account of the high concrete volume, the production of the filling concrete has the biggest effects on the life cycle assessment in most categories. On average around 25-30% comes from the stage A1-A3. The demolition of the building plays a lesser role. The loads at the landfill contribute up to 25% to the overall life cycle assessment.

Figure 21: Shares of loads of the product I 30 during the product stage (A1-A3)

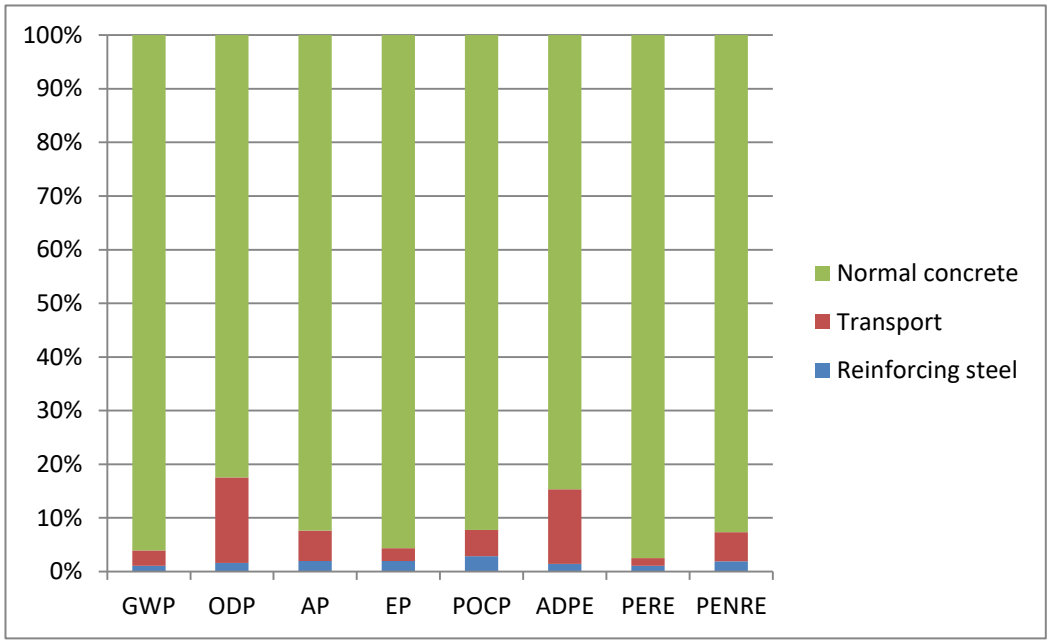


Legend

GWP = Global warming potential (without consideration of the CO_2 storage of wood); ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential;
POCP = Formation potential of tropospheric ozone; ADPE = Abiotic depletion potential for non-fossil resources; PERE = Renewable primary energy as energy carrier; PENRE = Non-renewable primary energy as energy carrier

In the product stage the ecological effects are mainly caused by the production of the used cement. The transport of the substances has a significant effect only in the categories ozone depletion potential and abiotic depletion potential. The energy input required to manufacture the declared product hardly plays a role in the life cycle assessment.

Figure 22: Shares of loads of the product I 30 during the installation stage (A5)



Legend

GWP = Global warming potential (without consideration of the CO_2 storage); ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone; ADPE = Abiotic depletion potential for non-fossil resources; PERE = Renewable primary energy as energy carrier; PENRE = Non-renewable primary energy as energy carrier

The loads in the installation stage are nearly entirely caused by the production of the filling concrete. A small part comes from the transport of the blocks from the manufacturer to the building site and from the transport of the filling concrete from the concrete plant to the building site.

3.4.8 Life cycle assessment results of the product TW 30

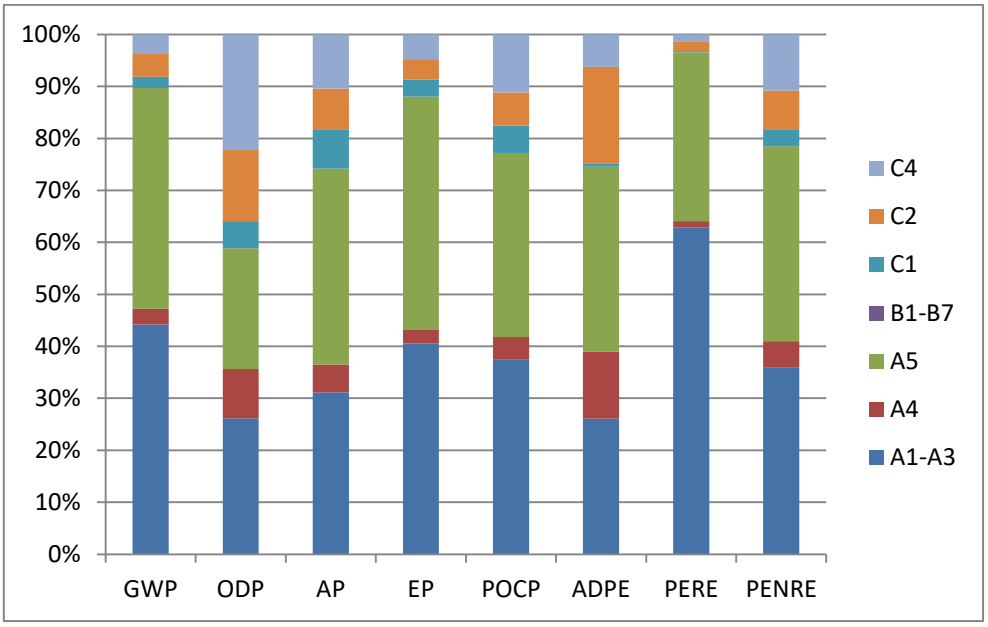


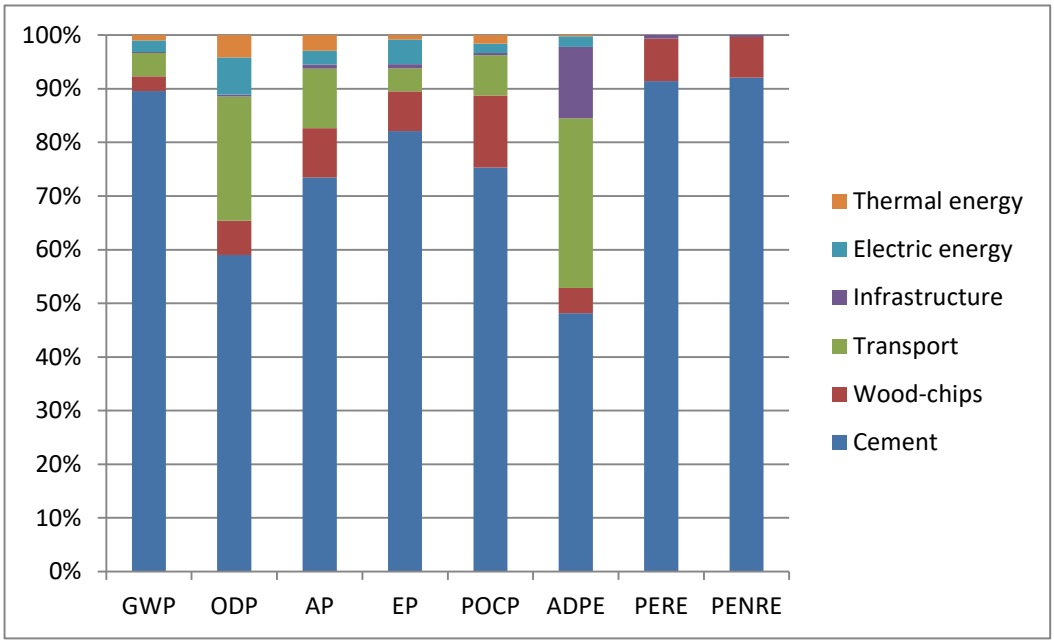
Figure 23: Shares of the individual life cycle stages in the total life cycle assessment of the product TW 30 in selected impact indicators

Legend

GWP = Global warming potential (without consideration of the CO_2 storage of wood and the carbonation of the concrete at the landfill); ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone; ADPE = Abiotic depletion potential for non-fossil resources; PERE = Renewable primary energy as energy carrier; PENRE = Non-renewable primary energy as energy carrier

Examining the ecological indicators over the entire life cycle illustrates that, in most categories, the manufacture of the filling concrete and the production of the wood-chip concrete shuttering block make roughly the same contribution to the ecological indicators. The demolition of the building plays a lesser role. The loads at the landfill contribute up to 20% to the overall life cycle assessment.

Figure 24: Shares of loads of the product TW 30 during the product stage (A1-A3)

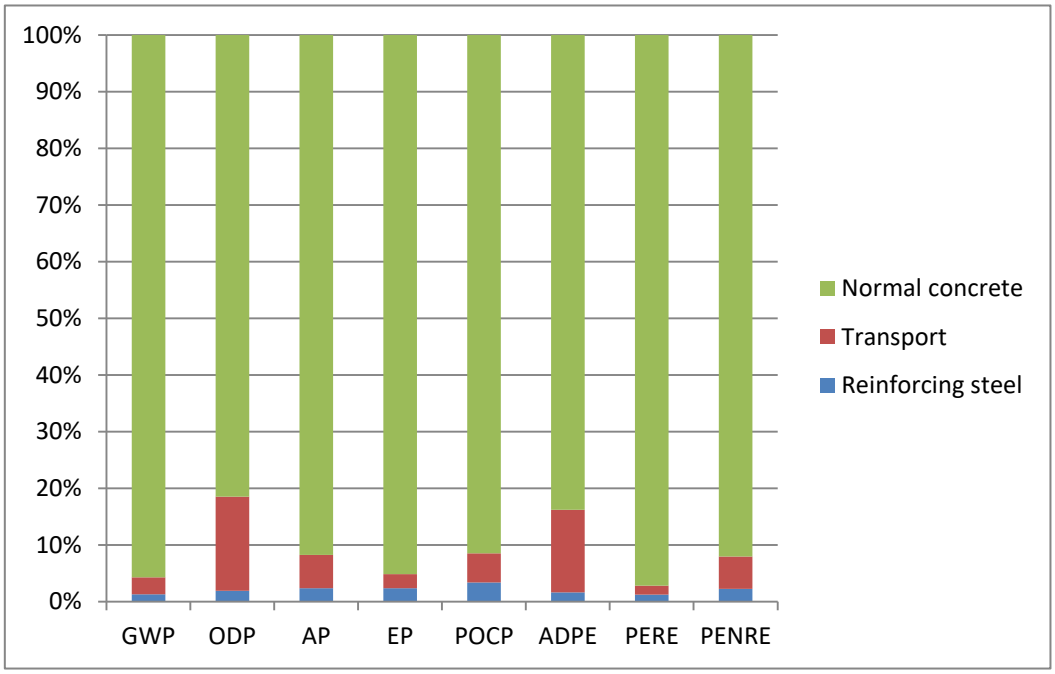


Legend

GWP = Global warming potential (without consideration of the CO_2 storage of wood); ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential;
POCP = Formation potential of tropospheric ozone; ADPE = Abiotic depletion potential for non-fossil resources; PERE = Renewable primary energy as energy carrier; PENRE = Non-renewable primary energy as energy carrier

In the product stage the ecological effects are mainly caused by the production of the used cement. The transport of the substances has a significant effect only in the categories ozone depletion potential and abiotic depletion potential. The energy input required to manufacture the declared product hardly plays a role in the life cycle assessment.

Figure 25: Shares of loads of the product TW 30 during the installation stage (A5)



Legend

GWP = Global warming potential (without consideration of the CO_2 storage); ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone; ADPE = Abiotic depletion potential for non-fossil resources; PERE = Renewable primary energy as energy carrier; PENRE = Non-renewable primary energy as energy carrier

The loads in the installation stage are nearly entirely caused by the production of the filling concrete. A small part comes from the transport of the blocks from the manufacturer to the building site and from the transport of the filling concrete from the concrete plant to the building site.

4 Dangerous substances and emissions into indoor air and environment

4.1 Declaration of substances of very high concern

Table 43: Declaration of substances of very high concern

Properties of hazardous materials as per EC Regulation 1272/2008 (CLP Regulation)	**Chemical term (CAS Number)**
Carcinogenic Cat. 1A or 1B (H350, H350i):	No such substances contained in the product
Mutagenic Cat. 1A or 1B (H340):	No such substances contained in the product
Toxic for reproduction Cat. 1A or 1B (H360F, H360D, H360FD, H360Fd, H360Df):	No such substances contained in the product
PBT (persistent, bioaccumulative and toxic) (REACH, Annex XIII):	No such substances contained in the product
vPvB (very persistent and very bioaccumulative) (REACH, Annex XIII):	No such substances contained in the product
Substances of very high concern (SVHC):	No such substances contained in the product

4.2 Formaldehyde emissions

There are no requirements regarding formaldehyde emissions for launching the product on the market.

4.3 Radioactivity

A sample of the wood-chip concrete shuttering block was examined for radioactivity by TÜV SÜD Industrie Service GmbH (Test report no. G 7110 001 for gamma-spectrometric measurements, from 25.04.2016).

Table 44: Result of the radioactivity measurement

Description	**Value**	**Limit**
Gamma-spectrometric measurement and evaluation of the chemical formula as per OENORM S 5200	0.055	1

4.4 Leaching

No measurements for leaching are required for launching the product on the market.

5 References

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