Environmental Product Declaration

In accordance with ISO 14025 and EN 15804 for:

Plasterboards

from

Knauf Danogips GmbH

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EPD Profile

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Product category rules (PCR): The International EPD System PCR for Construction Products and Construction Services 2012:01, version 2.31.
Independent third-party verification of the declaration and data, according to ISO 14025:2006: ☐ EPD process certification ☒ EPD verification

The EPD owner has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804.

Company information

Description of the organisation

The Knauf Group is a family-run, global company with 220 production sites worldwide and one of Europe's leading manufacturers of construction products, producing mainly products made of cement, lime and plaster and thermal insulating materials. In Åhus, Sweden, Knauf Danogips develops, produces and sells gypsum-based systems for light-weight constructions in a wide range of construction applications. They are certified according to SS EN ISO 9001:2015, SS EN ISO 14001:2015 and OHSAS 18001:2007.

Name and location of production site

Knauf Danogips' plasterboards are produced at their production site in Åhus, Sweden.

EPD Product description & Product inclusions

Product description

A plasterboard is a construction product used for covering walls and ceilings and the boards come in different varieties to meet different performance requirements, e.g. properties such as moisture resistance, acoustic insulation, fire performance and mechanical properties vary between different board types. The plasterboards from Knauf Danogips are mainly made of industrial gypsum, with additions of recycled gypsum and paper or glass fiber fleece sheet as the second and third largest components. The different boards covered in this EPD are depicted in Figure 1 below and described in further detail in Table 1. The different additives and improving agents in each board recipe give the boards their specific properties, and thus make them suitable for different construction applications.

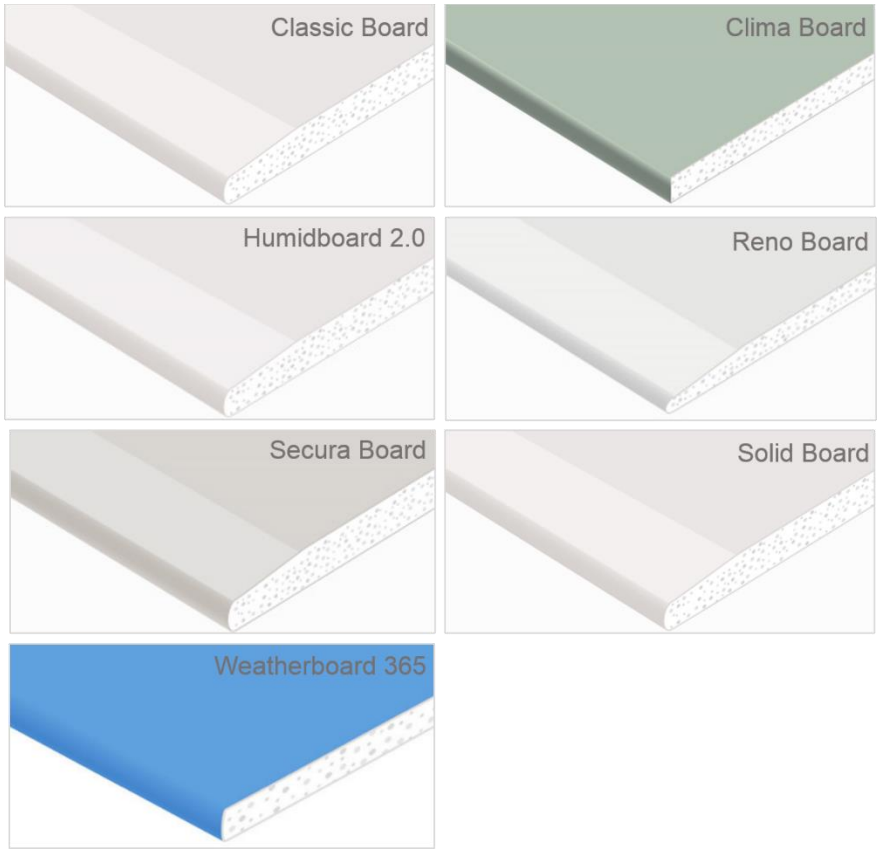

Figure 1. An illustration of the plasterboards from Knauf Danogips that are included in this EPD.

Product inclusion

The following seven products from Knauf Danogips' product range of plasterboards are included in this EPD: *Classic Board, Clima Board, Humidboard 2.0, Reno Board, Secura Board, Solid Board* and *Weatherboard 365*.

Classic Board, Clima Board, Reno Board, Secura Board and *Solid Board* are all paved with cardboard on both sides, while *Humidboard 2.0* and *Weatherboard 365* instead are paved with glass fleece fiber sheets. See
below for more detailed product-specific information and Figure 1 for illustrations of all boards.

Table 1. Table declaring the seven plasterboards from Knauf Danogips that are included in this EPD. The declared unit for this EPD is 1m^2 of plasterboard.

Product	**Classification**		**Code**	**Category**	
Knauf Danogips Plasterboards	UN CPC Ver. 2		37530	Articles of plaster or of compositions based on plaster	
Product name	**Product code**	**Area (m^2)**	**Thickness (mm)**	**Weight (kg)**	**Technical properties/ area of use**
Classic Board	13 A	1	12,5	8,6	Board suitable for a range of applications, such as cladding of walls, ceilings, pillars and beams, and also under floorboards. Applicable for simple room-separating structures as well as fire and sound insulating components.
Clima Board	9 EH	1	9,5	7	Used as wind protection in structures where it is desirable to avoid air currents and as rain protection during construction. Also functions as an airtight layer.
Humidboard 2.0	13 GM-H1	1	12,5	9	Board for interior walls in moisture-sensitive environments, has very low absorption capacity.
Reno Board	6 A	1	6,5	4,9	Board for cladding of existing walls and ceilings. Can also be used for curved structures.
Secura Board	15 F	1	15,5	13	A fire protection board for both roof and wall constructions, able to withstand high fire classes in thin wall- and ceiling structures.
Solid Board	13 I	1	12,5	11,4	Made for wall constructions demanding high shock resistance.
Weatherboard 365	9 GM-H1	1	9,5	7,3	Impregnated water-repellent board, resistant to mould and UV radiation. Designed to be exposed without facing for 12 months.

LCA information

Functional unit / declared unit: The declared unit is 1 m^2 plasterboard.

Reference service life: 50 years

Time representativeness: The specific data for the products and mass flows used for this EPD is from 2018/2019.

Geographical scope: The end-of-life scenario for all seven boards has been calculated for scenarios in Sweden.

Database(s) and LCA software used: The LCA software SimaPro 9.0.0 was used for this study, with data from the databases Ecoinvent 3 and USLCI.

Description of system boundaries: All life cycle stages from raw material extraction to the transportation of the finished product to the construction site are included, plus the end of life scenario. The scope is therefore a Cradle-to-gate with options; stages A1-A4, B1-B7, C1-C4.

Excluded lifecycle stages: A5 was excluded, since data was not available for this stage.

More information:
In accordance with the PCR, more than 95% of total inflows of mass and energy has been included in this Life Cycle Inventory. The main ingredient in the boards, industry gypsum, is a co-product from lignite production. The Polluter Pays principle is applied for this production, hence no burden from the lignite production is allocated to the industry gypsum.

Gypsum plasterboards can be recycled after deconstruction to a larger extent than presented in the end-of-life scenario in this EPD. The limiting factor is the logistics at building sites. In the future, a higher recycling ratio (>50%) of deconstruction gypsum is likely and preferable, since gypsum is an excellent material with no quality decrease in the recycling process. In addition, it is reasonable to assume that the actual recycling ratio is higher than the 30% assumed for, since it is economically beneficial for the deconstruction business to sort out a higher ratio for usage as soil improvement, and the use of demolished gypsum as soil improvement is classified as recycling.

Moreover, the recyclability of the plastic foil packaging is 100%.

System diagram

Figure 2. Flow diagram of the product life cycle, beginning with material collection through extraction, followed by manufacturing, distribution, usage, end-of life, waste treatment and finally disposal. Each step of the life cycle is described in further detail below.

Table 2. Table declaring the life cycle stages included in the LCA. X= included in the LCA, MND=Module Not Declared

Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage
Raw materials	Transport	Manufacturing	Transport	Construction-Installation	Use stage	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction	Transport	Waste processing	Disposal	Reuse-recovery-recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	MND	X	X	X	X	X	X	X	X	X	X	X	MND

Description of life cycle stages A1-A3: Raw material extraction and supply, transport and manufacture

Table 3. Description of life cycle stages A1, A2 and A3, covering the upstream and core processes of the product life cycle.

Stage	Description
A1 Raw materials	Extraction and processing of all raw materials occurring upstream from the manufacturing process, including the energy generation needed for these processes (extraction, refining and transport of energy from primary energy sources). Recycling processes of secondary materials from a previous product system that are used in the manufacturing process are also included, however processes that are part of the waste processing in the previous product system are excluded, referring to the polluter pays principle.
A2 Transport	The external transportation of raw materials to the manufacturing site. The modelling includes transportation on road, rail and/or ship, with processes for each raw material.
A3 Manufacturing	The manufacturing process as outlined in Figure 3 below, including the use of packaging materials and treatment of waste generated in this process up to the end-of-waste state or disposal of final residues, including any packaging not leaving the factory gate with the product. Production and transport of manufacturing fuels to the manufacturing site is included, as well as the recycling process of purchased recycled material, and recycled material transported to the manufacturing site.

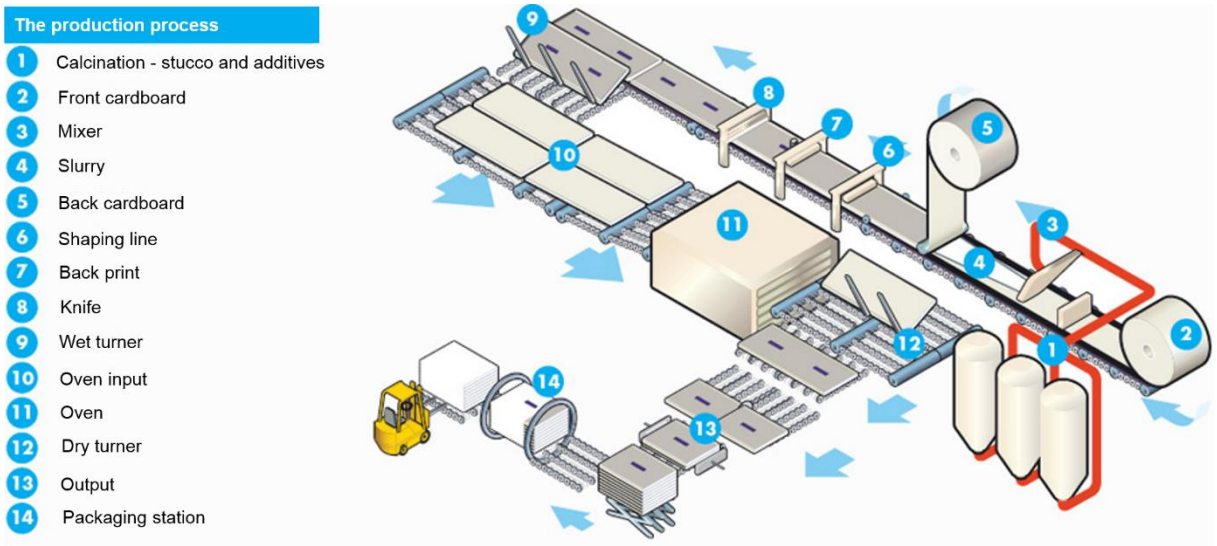

Figure 3. Flow diagram of the manufacturing process of Knauf Danogips' plaster boards. First, the industry gypsum and recycled gypsum are pre-dried to create stucco. The stucco is then mixed with the additives and improving agents specific for each board type, and subsequently poured with controlled speed on 900 mm wide cardboards or glass fiber fleece sheets. This is then covered by a second cardboard/fleece sheet and cut to board lengths. Finally, the boards are transported on a hoop to the oven, where they are dried. The boards are then packaged and stored on site in Åhus.

Description of life cycle stage A4: Transport from production gate to construction site

Table 4. Description of life cycle stage A4 – the first downstream process of the product life cycle

Stage	Parameter	Value
A4 Transport from production gate to construction site + Return transport of excess board material generated from final cutting at construction site	Vehicle type used for transport	42 ton sized truck, EURO 6 emission class.
	Vehicle load capacity	28 ton
	Gross vehicle weight	34 ton
	Fuel type and consumption	Diesel: 0.01699 kg/tonkm
	Distance to customer	An average distance of 350 km is assumed
	Capacity utilization factor	0.71

Description of life cycle stage B1-B7: Usage stages

From the use phases B1-B7, there is no contribution; neither of the plasterboards need maintenance, repair, replacement, refurbishment or use of energy or water during their lifetime.

Description of life cycle stage C1-C4: End of life stages

Table 5. Description of life cycle stages C1-C4, covering the final downstream processes i.e. the end of life stages of the product life cycle.

Stage	Description	Parameter	Value
C1 Deconstruction	Deconstruction including demolition of the product from the construction, including initial on-site sorting of the materials. Propane fueled building machine, 1 Wh/kg assumed.	Collection process specified by type	30% collected separately for recycling 70% collected with mixed construction waste
C2 Transport	Transportation of the discarded product to a recycling site, and transportation of waste to final sorting yard or disposal	Assumptions for scenario development	units as appropriate
C3 Waste processing	Collection of waste fractions from deconstruction, as well as processing of material flows intended for reuse, recycling and energy recovery	Recovery system specified by type	0% for re-use 30% for recycling 0% for energy recovery
C4 Disposal	Waste disposal, including physical pre-treatment and management of the disposal site, as well as emissions from the disposal	Disposal specified by type	70% for final deposition 100% packaging for incineration.

Environmental performance

Classic Board

Environmental impact

Table 6. The results from the LCA showing the environmental impacts from Classic Board during its different life cycle stages.

IMPACT CATEGORY	UNIT	A1-A3	A4	B1-B7	C1	C2	C3	C4	TOTAL
Acidification potential (AP)	kg SO_2 eq.	6,96E-03	6,37E-04	0,00E+00	6,34E-05	1,81E-04	5,65E-04	2,90E-04	**8,69E-03**
Eutrophication potential (EP)	kg PO_4^{3-} eq.	2,02E-03	1,36E-04	0,00E+00	1,19E-05	3,79E-05	1,18E-04	8,85E-05	**2,41E-03**
Global warming potential (GWP100a)	kg CO_2 eq.	1,56E+00	2,33E-01	0,00E+00	2,49E-02	5,05E-02	1,58E-01	3,63E-01	**2,39E+00**
Formation potential of tropospheric ozone (POCP)	kg C_2H_4 eq.	3,56E-04	3,66E-05	0,00E+00	7,09E-06	8,25E-06	2,58E-05	8,46E-06	**4,42E-04**
Abiotic depletion potential – Elements	kg Sb eq.	1,60E-06	4,56E-07	0,00E+00	9,59E-09	1,51E-07	4,73E-07	3,79E-08	**2,72E-06**
Abiotic depletion potential – Fossil resources	MJ, net calorific value	3,25E+01	3,82E+00	0,00E+00	3,22E-01	7,64E-01	2,39E+00	9,20E-01	**4,07E+01**
Water scarcity potential	m^3 eq.	4,47E-01	2,27E-02	0,00E+00	1,76E-03	3,92E-03	1,23E-02	4,05E-03	**4,92E-01**
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC 11 eq.	3,10E-07	4,67E-08	0,00E+00	3,93E-09	9,32E-09	2,91E-08	1,11E-08	**4,10E-07**

Classic Board

Use of resources

Table 7. The results from the LCA showing the resource consumption from Classic Board during its life cycle.

PARAMETER		UNIT	A1-A3	A4	B1-B7	C1	C2	C3	C4	TOTAL
Primary energy resources – Renewable	Used as energy carrier	MJ, net calorific value	3,04E+00	4,12E-02	0,00E+00	2,46E-03	8,18E-03	2,55E-02	1,25E-02	**3,13E+00**
	Used as raw materials	MJ, net calorific value	7,17E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**7,17E+00**
	TOTAL	MJ, net calorific value	1,02E+01	4,12E-02	0,00E+00	2,46E-03	8,18E-03	2,55E-02	1,25E-02	**1,03E+01**
Primary energy resources – Non-renewable	Use as energy carrier	MJ, net calorific value	3,61E+01	3,89E+00	0,00E+00	3,26E-01	7,77E-01	2,43E+00	9,41E-01	**4,44E+01**
	Used as raw materials	MJ, net calorific value	3,11E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**3,11E+00**
	TOTAL	MJ, net calorific value	3,92E+01	3,89E+00	0,00E+00	3,26E-01	7,77E-01	2,43E+00	9,41E-01	**4,75E+01**
Secondary material		kg	9,41E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**9,41E+00**
Renewable secondary fuels		MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**
Non-renewable secondary fuels		MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**
Net use of fresh water		m^3	1,32E-02	8,37E-04	0,00E+00	3,12E-05	1,32E-04	4,11E-04	1,07E-03	**1,57E-02**

Waste production and output flows

Classic Board

Waste production

Table 8. The results from the LCA showing the waste production from Classic Board during its different life cycle stages.

IMPACT CATEGORY	UNIT	A1-A3	A4	B1-B7	C1	C2	C3	C4	TOTAL
Hazardous waste disposed	kg	3,17E-04	1,27E-05	0,00E+00	0,00E+00	1,93E-06	6,03E-06	0,00E+00	**3,37E-04**
Non-hazardous waste disposed	kg	6,22E-02	2,36E-01	0,00E+00	0,00E+00	3,51E-02	1,10E-01	6,13E+00	**6,58E+00**
Radioactive waste disposed	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**

Output flows

Table 9. The results from the LCA showing the output flows from Classic Board during its different life cycle stages.

IMPACT CATEGORY	UNIT	A1-A3	A4	B1-B7	C1	C2	C3	C4	TOTAL
Components for reuse	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**
Material for recycling	kg	8,43E-01	4,06E-03	0,00E+00	0,00E+00	6,03E-04	1,88E-03	0,00E+00	**8,49E-01**
Materials for energy recovery	kg	7,02E-02	5,67E-03	0,00E+00	1,48E-04	8,62E-04	2,69E-03	0,00E+00	**7,96E-02**
Energy recovery	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**

Environmental performance

Clima Board

Environmental impact

Table 10. The results from the LCA showing the environmental impacts from Clima Board during its different life cycle stages.

IMPACT CATEGORY	UNIT	A1-A3	A4	B1-B7	C1	C2	C3	C4	TOTAL
Acidification potential (AP)	kg SO_2 eq.	6,66E-03	5,20E-04	0,00E+00	5,16E-05	2,13E-04	1,23E-04	3,31E-04	**7,90E-03**
Eutrophication potential (EP)	kg PO_4^{3-} eq.	1,96E-03	1,12E-04	0,00E+00	9,71E-06	4,46E-05	2,58E-05	9,60E-05	**2,25E-03**
Global warming potential (GWP100a)	kg CO_2 eq.	1,53E+00	1,90E-01	0,00E+00	2,03E-02	5,95E-02	3,44E-02	3,67E-01	**2,20E+00**
Formation potential of tropospheric ozone (POCP)	kg C_2H_4 eq.	3,27E-04	2,99E-05	0,00E+00	5,77E-06	9,72E-06	5,62E-06	9,77E-06	**3,88E-04**
Abiotic depletion potential – Elements	kg Sb eq.	2,02E-06	3,72E-07	0,00E+00	7,81E-09	1,78E-07	1,03E-07	4,30E-08	**2,72E-06**
Abiotic depletion potential – Fossil resources	MJ, net calorific value	3,67E+01	3,13E+00	0,00E+00	2,62E-01	9,00E-01	5,20E-01	1,07E+00	**4,26E+01**
Water scarcity potential	m^3 eq.	2,76E-01	1,85E-02	0,00E+00	1,43E-03	4,62E-03	2,67E-03	4,65E-03	**3,08E-01**
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC 11 eq.	2,87E-07	3,82E-08	0,00E+00	3,20E-09	1,10E-08	6,34E-09	1,30E-08	**3,59E-07**

Clima Board

Use of resources

Table 11. The results from the LCA showing the resource consumption from Clima Board during its life cycle.

PARAMETER		UNIT	A1-A3	A4	B1-B7	C1	C2	C3	C4	TOTAL
Primary energy resources – Renewable	Used as energy carrier	MJ, net calorific value	3,12E+00	3,37E-02	0,00E+00	2,00E-03	9,63E-03	5,57E-03	1,46E-02	**3,19E+00**
	Used as raw materials	MJ, net calorific value	7,94E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**7,94E+00**
	TOTAL	MJ, net calorific value	1,11E+01	3,37E-02	0,00E+00	2,00E-03	9,63E-03	5,57E-03	1,46E-02	**1,11E+01**
Primary energy resources – Non-renewable	Use as energy carrier	MJ, net calorific value	4,27E+01	3,38E+00	0,00E+00	2,82E-01	9,71E-01	5,61E-01	1,17E+00	**4,90E+01**
	Used as raw materials	MJ, net calorific value	8,50E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**8,50E+00**
	TOTAL	MJ, net calorific value	5,12E+01	3,38E+00	0,00E+00	2,82E-01	9,71E-01	5,61E-01	1,17E+00	**5,75E+01**
Secondary material		kg	7,68E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**7,68E+00**
Renewable secondary fuels		MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**
Non-renewable secondary fuels		MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**
Net use of fresh water		m^3	1,18E-02	6,84E-04	0,00E+00	2,54E-05	1,55E-04	8,96E-05	1,24E-03	**1,40E-02**

Waste production and output flows

Clima Board

Waste production

Table 12. The results from the LCA showing the waste production from Clima Board during its different life cycle stages.

IMPACT CATEGORY	UNIT	A1-A3	A4	B1-B7	C1	C2	C3	C4	TOTAL
Hazardous waste disposed	kg	2,94E-04	1,04E-05	0,00E+00	0,00E+00	2,27E-06	1,31E-06	0,00E+00	**3,08E-04**
Non-hazardous waste disposed	kg	7,96E-02	1,93E-01	0,00E+00	0,00E+00	4,13E-02	2,39E-02	7,22E+00	**7,56E+00**
Radioactive waste disposed	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**

Output flows

Table 13. The results from the LCA showing the output flows from Clima Board during its different life cycle stages.

IMPACT CATEGORY	UNIT	A1-A3	A4	B1-B7	C1	C2	C3	C4	TOTAL
Components for reuse	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**
Material for recycling	kg	6,68E-01	3,32E-03	0,00E+00	0,00E+00	7,11E-04	4,11E-04	0,00E+00	**6,73E-01**
Materials for energy recovery	kg	5,68E-02	4,64E-03	0,00E+00	1,20E-04	1,02E-03	5,87E-04	0,00E+00	**6,31E-02**
Energy recovery	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**

Environmental performance

Humidboard 2.0

Environmental impact

Table 14. The results from the LCA showing the environmental impacts from Humidboard 2.0 during its different life cycle stages.

IMPACT CATEGORY	UNIT	A1-A3	A4	B1-B7	C1	C2	C3	C4	TOTAL
Acidification potential (AP)	kg SO_2 eq.	1,02E-02	6,66E-04	0,00E+00	6,63E-05	2,56E-04	1,57E-04	3,86E-04	**1,17E-02**
Eutrophication potential (EP)	kg PO_4^{3-} eq.	2,75E-03	1,43E-04	0,00E+00	1,25E-05	5,36E-05	3,28E-05	1,06E-04	**3,10E-03**
Global warming potential (GWP100a)	kg CO_2 eq.	2,05E+00	2,43E-01	0,00E+00	2,61E-02	7,14E-02	4,37E-02	3,73E-01	**2,80E+00**
Formation potential of tropospheric ozone (POCP)	kg C_2H_4 eq.	5,00E-04	3,82E-05	0,00E+00	7,42E-06	1,17E-05	7,15E-06	1,15E-05	**5,76E-04**
Abiotic depletion potential – Elements	kg Sb eq.	2,37E-06	4,76E-07	0,00E+00	1,00E-08	2,14E-07	1,31E-07	4,97E-08	**3,25E-06**
Abiotic depletion potential – Fossil resources	MJ, net calorific value	3,84E+01	4,00E+00	0,00E+00	3,37E-01	1,08E+00	6,62E-01	1,27E+00	**4,58E+01**
Water scarcity potential	m^3 eq.	6,08E-01	2,37E-02	0,00E+00	1,84E-03	5,55E-03	3,40E-03	5,45E-03	**6,48E-01**
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC 11 eq.	3,38E-07	4,89E-08	0,00E+00	4,11E-09	1,32E-08	8,07E-09	1,54E-08	**4,27E-07**

Humidboard 2.0

Use of resources

Table 15. The results from the LCA showing the resource consumption from Humidboard 2.0 during its life cycle.

PARAMETER		UNIT	A1-A3	A4	B1-B7	C1	C2	C3	C4	TOTAL
Primary energy resources – Renewable	Used as energy carrier	MJ, net calorific value	2,68E+00	4,30E-02	0,00E+00	2,58E-03	1,16E-02	7,08E-03	1,73E-02	**2,76E+00**
	Used as raw materials	MJ, net calorific value	1,08E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**1,08E+00**
	TOTAL	MJ, net calorific value	3,76E+00	4,30E-02	0,00E+00	2,58E-03	1,16E-02	7,08E-03	1,73E-02	**3,84E+00**
Primary energy resources – Non-renewable	Use as energy carrier	MJ, net calorific value	4,52E+01	4,32E+00	0,00E+00	3,62E-01	1,17E+00	7,14E-01	1,38E+00	**5,32E+01**
	Used as raw materials	MJ, net calorific value	4,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**4,00E+00**
	TOTAL	MJ, net calorific value	4,92E+01	4,32E+00	0,00E+00	3,62E-01	1,17E+00	7,14E-01	1,38E+00	**5,72E+01**
Secondary material		kg	9,36E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**9,36E+00**
Renewable secondary fuels		MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**
Non-renewable secondary fuels		MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**
Net use of fresh water		m^3	1,38E-02	8,75E-04	0,00E+00	3,27E-05	1,86E-04	1,14E-04	1,47E-03	**1,65E-02**

Waste production and output flows

Humidboard 2.0

Waste production

Table 16. The results from the LCA showing the waste production from Humidboard 2.0 during its different life cycle stages.

IMPACT CATEGORY	UNIT	A1-A3	A4	B1-B7	C1	C2	C3	C4	TOTAL
Hazardous waste disposed	kg	3,07E-04	1,33E-05	0,00E+00	0,00E+00	2,73E-06	1,67E-06	0,00E+00	**3,25E-04**
Non-hazardous waste disposed	kg	4,48E-02	2,47E-01	0,00E+00	0,00E+00	4,96E-02	3,04E-02	8,67E+00	**9,04E+00**
Radioactive waste disposed	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**

Output flows

Table 17. The results from the LCA showing the output flows from Humidboard 2.0 during its different life cycle stages.

IMPACT CATEGORY	UNIT	A1-A3	A4	B1-B7	C1	C2	C3	C4	TOTAL
Components for reuse	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**
Material for recycling	kg	8,97E-01	4,25E-03	0,00E+00	0,00E+00	8,53E-04	5,23E-04	0,00E+00	**9,02E-01**
Materials for energy recovery	kg	1,37E-01	5,93E-03	0,00E+00	1,54E-04	1,22E-03	7,46E-04	0,00E+00	**1,46E-01**
Energy recovery	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**

Environmental performance

Reno Board

Environmental impact

Table 18. The results from the LCA showing the environmental impacts from Reno Board during its different life cycle stages.

IMPACT CATEGORY	UNIT	A1-A3	A4	B1-B7	C1	C2	C3	C4	TOTAL
Acidification potential (AP)	kg SO_2 eq.	5,54E-03	3,68E-04	0,00E+00	3,61E-05	2,53E-04	1,53E-04	3,82E-04	**6,73E-03**
Eutrophication potential (EP)	kg PO_4^{3-} eq.	1,92E-03	7,89E-05	0,00E+00	6,80E-06	5,30E-05	3,20E-05	1,05E-04	**2,20E-03**
Global warming potential (GWP100a)	kg CO_2 eq.	1,26E+00	1,35E-01	0,00E+00	1,42E-02	7,06E-02	4,26E-02	3,73E-01	**1,89E+00**
Formation potential of tropospheric ozone (POCP)	kg C_2H_4 eq.	2,61E-04	2,12E-05	0,00E+00	4,04E-06	1,15E-05	6,97E-06	1,14E-05	**3,17E-04**
Abiotic depletion potential – Elements	kg Sb eq.	1,31E-06	2,63E-07	0,00E+00	5,47E-09	2,12E-07	1,28E-07	4,92E-08	**1,97E-06**
Abiotic depletion potential – Fossil resources	MJ, net calorific value	2,56E+01	2,21E+00	0,00E+00	1,83E-01	1,07E+00	6,45E-01	1,26E+00	**3,10E+01**
Water scarcity potential	m^3 eq.	3,39E-01	1,31E-02	0,00E+00	1,00E-03	5,49E-03	3,31E-03	5,40E-03	**3,67E-01**
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC 11 eq.	2,25E-07	2,70E-08	0,00E+00	2,24E-09	1,30E-08	7,86E-09	1,53E-08	**2,90E-07**

Reno Board

Use of resources

Table 19. The results from the LCA showing the resource consumption from Reno Board during its life cycle.

PARAMETER		UNIT	A1-A3	A4	B1-B7	C1	C2	C3	C4	TOTAL
Primary energy resources – Renewable	Used as energy carrier	MJ, net calorific value	3,17E+00	2,38E-02	0,00E+00	1,40E-03	1,14E-02	6,90E-03	1,71E-02	**3,23E+00**
	Used as raw materials	MJ, net calorific value	7,27E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**7,27E+00**
	TOTAL	MJ, net calorific value	1,04E+01	2,38E-02	0,00E+00	1,40E-03	1,14E-02	6,90E-03	1,71E-02	**1,05E+01**
Primary energy resources – Non-renewable	Use as energy carrier	MJ, net calorific value	3,09E+01	2,39E+00	0,00E+00	1,97E-01	1,15E+00	6,96E-01	1,37E+00	**3,67E+01**
	Used as raw materials	MJ, net calorific value	3,11E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**3,11E+00**
	TOTAL	MJ, net calorific value	3,40E+01	2,39E+00	0,00E+00	1,97E-01	1,15E+00	6,96E-01	1,37E+00	**3,98E+01**
Secondary material		kg	5,33E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**5,33E+00**
Renewable secondary fuels		MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**
Non-renewable secondary fuels		MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**
Net use of fresh water		m^3	9,51E-03	4,84E-04	0,00E+00	1,78E-05	1,84E-04	1,11E-04	1,46E-03	**1,18E-02**

Waste production and output flows

Reno Board

Waste production

Table 20. The results from the LCA showing the waste production from Reno Board during its different life cycle stages.

IMPACT CATEGORY	UNIT	A1-A3	A4	B1-B7	C1	C2	C3	C4	TOTAL
Hazardous waste disposed	kg	2,57E-04	7,35E-06	0,00E+00	0,00E+00	2,70E-06	1,63E-06	0,00E+00	**2,69E-04**
Non-hazardous waste disposed	kg	5,51E-02	1,37E-01	0,00E+00	0,00E+00	4,91E-02	2,96E-02	8,58E+00	**8,85E+00**
Radioactive waste disposed	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**

Output flows

Table 21. The results from the LCA showing the output flows from Reno Board during its different life cycle stages.

IMPACT CATEGORY	UNIT	A1-A3	A4	B1-B7	C1	C2	C3	C4	TOTAL
Components for reuse	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**
Material for recycling	kg	4,74E-01	2,35E-03	0,00E+00	0,00E+00	8,44E-04	5,09E-04	0,00E+00	**4,77E-01**
Materials for energy recovery	kg	2,02E-02	3,28E-03	0,00E+00	8,41E-05	1,21E-03	7,28E-04	0,00E+00	**2,55E-02**
Energy recovery	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**

Environmental performance

Secura Board

Environmental impact

Table 22. The results from the LCA showing the environmental impacts from Secura Board during its different life cycle stages.

IMPACT CATEGORY	UNIT	A1-A3	A4	B1-B7	C1	C2	C3	C4	TOTAL
Acidification potential (AP)	kg SO_2 eq.	1,12E-02	9,56E-04	0,00E+00	9,58E-05	3,92E-04	2,32E-04	5,61E-04	**1,34E-02**
Eutrophication potential (EP)	kg PO_4^{3-} eq.	2,43E-03	2,05E-04	0,00E+00	1,80E-05	8,22E-05	4,86E-05	1,38E-04	**2,93E-03**
Global warming potential (GWP100a)	kg CO_2 eq.	2,81E+00	3,50E-01	0,00E+00	3,77E-02	1,09E-01	6,47E-02	3,93E-01	**3,76E+00**
Formation potential of tropospheric ozone (POCP)	kg C_2H_4 eq.	5,68E-04	5,49E-05	0,00E+00	1,07E-05	1,79E-05	1,06E-05	1,70E-05	**6,79E-04**
Abiotic depletion potential – Elements	kg Sb eq.	4,59E-06	6,84E-07	0,00E+00	1,45E-08	3,28E-07	1,94E-07	7,10E-08	**5,88E-06**
Abiotic depletion potential – Fossil resources	MJ, net calorific value	5,54E+01	5,74E+00	0,00E+00	4,87E-01	1,66E+00	9,80E-01	1,92E+00	**6,61E+01**
Water scarcity potential	m^3 eq.	5,55E-01	3,40E-02	0,00E+00	2,66E-03	8,50E-03	5,03E-03	8,00E-03	**6,13E-01**
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC 11 eq.	6,05E-07	7,02E-08	0,00E+00	5,94E-09	2,02E-08	1,19E-08	2,33E-08	**7,36E-07**

Secura Board

Use of resources

Table 23. The results from the LCA showing the resource consumption from Secura Board during its life cycle.

PARAMETER		UNIT	A1-A3	A4	B1-B7	C1	C2	C3	C4	TOTAL
Primary energy resources – Renewable	Used as energy carrier	MJ, net calorific value	3,18E+00	6,18E-02	0,00E+00	3,72E-03	1,77E-02	1,05E-02	2,59E-02	**3,30E+00**
	Used as raw materials	MJ, net calorific value	7,14E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**7,14E+00**
	TOTAL	MJ, net calorific value	1,03E+01	6,18E-02	0,00E+00	3,72E-03	1,77E-02	1,05E-02	2,59E-02	**1,04E+01**
Primary energy resources – Non-renewable	Use as energy carrier	MJ, net calorific value	6,28E+01	6,20E+00	0,00E+00	5,23E-01	1,79E+00	1,06E+00	2,08E+00	**7,45E+01**
	Used as raw materials	MJ, net calorific value	3,11E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**3,11E+00**
	TOTAL	MJ, net calorific value	6,60E+01	6,20E+00	0,00E+00	5,23E-01	1,79E+00	1,06E+00	2,08E+00	**7,76E+01**
Secondary material		kg	1,41E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**1,41E+01**
Renewable secondary fuels		MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**
Non-renewable secondary fuels		MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**
Net use of fresh water		m^3	1,92E-02	1,26E-03	0,00E+00	4,72E-05	2,85E-04	1,69E-04	2,20E-03	**2,32E-02**

Waste production and output flows

Secura Board

Waste production

Table 24. The results from the LCA showing the waste production from Secura Board during its different life cycle stages.

IMPACT CATEGORY	UNIT	A1-A3	A4	B1-B7	C1	C2	C3	C4	TOTAL
Hazardous waste disposed	kg	4,21E-04	1,91E-05	0,00E+00	0,00E+00	4,18E-06	2,48E-06	0,00E+00	**4,47E-04**
Non-hazardous waste disposed	kg	6,98E-01	3,55E-01	0,00E+00	0,00E+00	7,61E-02	4,50E-02	1,33E+01	**1,45E+01**
Radioactive waste disposed	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**

Output flows

Table 25.The results from the LCA showing the output flows from Secura Board during its different life cycle stages.

IMPACT CATEGORY	UNIT	A1-A3	A4	B1-B7	C1	C2	C3	C4	TOTAL
Components for reuse	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**
Material for recycling	kg	1,25E+00	6,10E-03	0,00E+00	0,00E+00	1,31E-03	7,74E-04	0,00E+00	**1,26E+00**
Materials for energy recovery	kg	2,60E-01	8,52E-03	0,00E+00	2,23E-04	1,87E-03	1,11E-03	0,00E+00	**2,71E-01**
Energy recovery	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**

Environmental performance

Solid Board

Environmental impact

Table 26. The results from the LCA showing the environmental impacts from Solid Board during its different life cycle stages.

IMPACT CATEGORY	UNIT	A1-A3	A4	B1-B7	C1	C2	C3	C4	TOTAL
Acidification potential (AP)	kg SO_2 eq.	7,52E-03	8,40E-04	0,00E+00	8,40E-05	3,33E-04	2,02E-04	4,85E-04	**9,46E-03**
Eutrophication potential (EP)	kg PO_4^{3-} eq.	2,37E-03	1,80E-04	0,00E+00	1,58E-05	6,98E-05	4,23E-05	1,24E-04	**2,80E-03**
Global warming potential (GWP100a)	kg CO_2 eq.	1,70E+00	3,07E-01	0,00E+00	3,31E-02	9,30E-02	5,63E-02	3,84E-01	**2,57E+00**
Formation potential of tropospheric ozone (POCP)	kg C_2H_4 eq.	3,63E-04	4,82E-05	0,00E+00	9,40E-06	1,52E-05	9,20E-06	1,46E-05	**4,59E-04**
Abiotic depletion potential – Elements	kg Sb eq.	1,86E-06	6,01E-07	0,00E+00	1,27E-08	2,79E-07	1,69E-07	6,18E-08	**2,98E-06**
Abiotic depletion potential – Fossil resources	MJ, net calorific value	3,43E+01	5,05E+00	0,00E+00	4,27E-01	1,41E+00	8,52E-01	1,64E+00	**4,36E+01**
Water scarcity potential	m^3 eq.	4,56E-01	2,99E-02	0,00E+00	2,33E-03	7,23E-03	4,37E-03	6,90E-03	**5,07E-01**
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC 11 eq.	3,29E-07	6,17E-08	0,00E+00	5,21E-09	1,72E-08	1,04E-08	1,99E-08	**4,43E-07**

Solid Board

Use of resources

Table 27. The results from the LCA showing the resource consumption from Solid Board during its life cycle.

PARAMETER		UNIT	A1-A3	A4	B1-B7	C1	C2	C3	C4	TOTAL
Primary energy resources – Renewable	Used as energy carrier	MJ, net calorific value	3,21E+00	5,43E-02	0,00E+00	3,26E-03	1,51E-02	9,12E-03	2,22E-02	**3,32E+00**
	Used as raw materials	MJ, net calorific value	8,62E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**8,62E+00**
	TOTAL	MJ, net calorific value	1,18E+01	5,43E-02	0,00E+00	3,26E-03	1,51E-02	9,12E-03	2,22E-02	**1,19E+01**
Primary energy resources – Non-renewable	Use as energy carrier	MJ, net calorific value	4,04E+01	5,45E+00	0,00E+00	4,59E-01	1,52E+00	9,19E-01	1,78E+00	**5,05E+01**
	Used as raw materials	MJ, net calorific value	3,11E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**3,11E+00**
	TOTAL	MJ, net calorific value	4,35E+01	5,45E+00	0,00E+00	4,59E-01	1,52E+00	9,19E-01	1,78E+00	**5,36E+01**
Secondary material		kg	1,24E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**1,24E+01**
Renewable secondary fuels		MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**
Non-renewable secondary fuels		MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**
Net use of fresh water		m^3	1,40E-02	1,10E-03	0,00E+00	4,14E-05	2,42E-04	1,47E-04	1,89E-03	**1,74E-02**

Waste production and output flows

Solid Board

Waste production

Table 28. The results from the LCA showing the waste production from Solid Board during its different life cycle stages.

IMPACT CATEGORY	UNIT	A1-A3	A4	B1-B7	C1	C2	C3	C4	TOTAL
Hazardous waste disposed	kg	3,08E-04	1,68E-05	0,00E+00	0,00E+00	3,56E-06	2,15E-06	0,00E+00	**3,31E-04**
Non-hazardous waste disposed	kg	1,14E-01	3,12E-01	0,00E+00	0,00E+00	6,47E-02	3,91E-02	1,13E+01	**1,18E+01**
Radioactive waste disposed	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**

Output flows

Table 29.The results from the LCA showing the output flows from Solid Board during its different life cycle stages.

IMPACT CATEGORY	UNIT	A1-A3	A4	B1-B7	C1	C2	C3	C4	TOTAL
Components for reuse	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**
Material for recycling	kg	1,12E+00	5,36E-03	0,00E+00	0,00E+00	1,11E-03	6,73E-04	0,00E+00	**1,12E+00**
Materials for energy recovery	kg	8,76E-02	7,49E-03	0,00E+00	1,96E-04	1,59E-03	9,61E-04	0,00E+00	**9,78E-02**
Energy recovery	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**

Environmental performance

Weatherboard 365

Environmental impact

Table 30. The results from the LCA showing the environmental impacts from Weatherboard 365 during its different life cycle stages.

IMPACT CATEGORY	UNIT	A1-A3	A4	B1-B7	C1	C2	C3	C4	TOTAL
Acidification potential (AP)	kg SO_2 eq.	1,19E-02	5,42E-04	0,00E+00	5,38E-05	2,21E-04	1,31E-04	3,41E-04	**1,32E-02**
Eutrophication potential (EP)	kg PO_4^{3-} eq.	2,90E-03	1,16E-04	0,00E+00	1,01E-05	4,62E-05	2,74E-05	9,78E-05	**3,19E-03**
Global warming potential (GWP100a)	kg CO_2 eq.	2,29E+00	1,98E-01	0,00E+00	2,12E-02	6,16E-02	3,64E-02	3,68E-01	**2,98E+00**
Formation potential of tropospheric ozone (POCP)	kg C_2H_4 eq.	5,64E-04	3,12E-05	0,00E+00	6,02E-06	1,01E-05	5,96E-06	1,01E-05	**6,28E-04**
Abiotic depletion potential – Elements	kg Sb eq.	3,38E-06	3,88E-07	0,00E+00	8,14E-09	1,85E-07	1,09E-07	4,42E-08	**4,11E-06**
Abiotic depletion potential – Fossil resources	MJ, net calorific value	4,98E+01	3,26E+00	0,00E+00	2,73E-01	9,33E-01	5,52E-01	1,11E+00	**5,59E+01**
Water scarcity potential	m^3 eq.	4,62E-01	1,93E-02	0,00E+00	1,49E-03	4,79E-03	2,83E-03	4,80E-03	**4,95E-01**
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC 11 eq.	3,42E-07	3,98E-08	0,00E+00	3,34E-09	1,14E-08	6,72E-09	1,34E-08	**4,17E-07**

Weatherboard 365

Use of resources

Table 31. The results from the LCA showing the resource consumption from Weatherboard 365 during its life cycle.

PARAMETER		UNIT	A1-A3	A4	B1-B7	C1	C2	C3	C4	TOTAL
Primary energy resources – Renewable	Used as energy carrier	MJ, net calorific value	2,78E+00	3,51E-02	0,00E+00	2,09E-03	9,98E-03	5,90E-03	1,50E-02	**2,84E+00**
	Used as raw materials	MJ, net calorific value	1,02E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**1,02E+00**
	TOTAL	MJ, net calorific value	3,80E+00	3,51E-02	0,00E+00	2,09E-03	9,98E-03	5,90E-03	1,50E-02	**3,87E+00**
Primary energy resources – Non-renewable	Use as energy carrier	MJ, net calorific value	5,71E+01	3,52E+00	0,00E+00	2,94E-01	1,01E+00	5,95E-01	1,20E+00	**6,37E+01**
	Used as raw materials	MJ, net calorific value	1,28E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**1,28E+01**
	TOTAL	MJ, net calorific value	6,98E+01	3,52E+00	0,00E+00	2,94E-01	1,01E+00	5,95E-01	1,20E+00	**7,64E+01**
Secondary material		kg	7,80E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**7,80E+00**
Renewable secondary fuels		MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**
Non-renewable secondary fuels		MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**
Net use of fresh water		m^3	1,44E-02	7,13E-04	0,00E+00	2,65E-05	1,61E-04	9,50E-05	1,28E-03	**1,66E-02**

Waste production and output flows

Weatherboard 365

Waste production

Table 32. The results from the LCA showing the waste production from Weatherboard 365 during its different life cycle stages.

IMPACT CATEGORY	UNIT	A1-A3	A4	B1-B7	C1	C2	C3	C4	TOTAL
Hazardous waste disposed	kg	2,98E-04	1,08E-05	0,00E+00	0,00E+00	2,36E-06	1,39E-06	0,00E+00	**3,12E-04**
Non-hazardous waste disposed	kg	8,83E-02	2,01E-01	0,00E+00	0,00E+00	4,28E-02	2,53E-02	7,48E+00	**7,84E+00**
Radioactive waste disposed	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**

Output flows

Table 33. The results from the LCA showing the output flows from Weatherboard 365 during its different life cycle stages.

IMPACT CATEGORY	UNIT	A1-A3	A4	B1-B7	C1	C2	C3	C4	TOTAL
Components for reuse	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**
Material for recycling	kg	7,07E-01	3,46E-03	0,00E+00	0,00E+00	7,36E-04	4,35E-04	0,00E+00	**7,11E-01**
Materials for energy recovery	kg	5,64E-02	4,83E-03	0,00E+00	1,25E-04	1,05E-03	6,22E-04	0,00E+00	**6,30E-02**
Energy recovery	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**

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