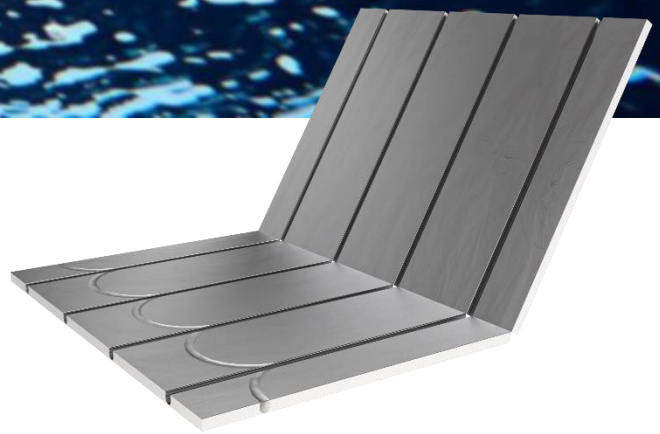
Environmental Product Declaration

In accordance with ISO 14025 and EN 15804:2012+A2:2019

LK CombiBoard EPS

LK Systems AB



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This EPD covers multiple products made from the same materials in the same factory. The EPD is based on the average results of the product group and the different variations only varies in thickness. An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com

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CEN standard EN 15804 serves as the Core Product Category Rules (PCR)

Product category rules (PCR): 2019:14, Construction products (EN 15804:A2) (1.3.2)

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

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

☐ EPD process certification ☒ EPD verification

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Approved by: The International EPD® System.

The EPD owner has the sole ownership, liability, and responsibility for the EPD.

EPDs within the same product category but registered in different EPD programmes, or not compliant with EN 15804, may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterization factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

Company information

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LK Systems is the leading manufacturer of easy-to-install systems for heating and tap water distribution in the Nordic region. Our prefabrication factory provides customized solutions to simplify the installation process even further. From idea to final solution, you can be sure of the smartest answers for your everyday challenges, today and tomorrow.

For the simpler, smarter everyday
Simpler. Smarter. More sustainable. At LK, we believe there's a better way to do everything. That's why – from water, heating and hydronic solutions to pipe extrusion – we push for innovation over status quo and simplicity over complexity. It's a belief all of us at LK apply to every product and solution we create.

Location of production site:
Sweden

Product information

LK CombiBoard EPS made of EPS with a full cover aluminium heat distribution sheet. The plates are sold in different dimensions to suit various floor heating systems.

Further information can be found at https://www.lksystems.se/

The EPD represents several product versions and is a representative value based on LK CombiBoard EPS 30 as the declared unit. The results presented in the EPD show the results of the representative product, with variations staying within 10% (GWP-GHG). Please see the appendix for the total weight of the products included in the EPD.

LCA information

Functional unit / declared unit
In accordance with EN 15804 + A2 the declared unit is 1 kg of mass.

Time representativeness
2023

Database
Ecoinvent 3.9. - “allocation cut off by classification” is used throughout the study.

LCA software used
SimaPro 9.5.

Geographical scope
Production: Sweden
Construction site: Sweden

LCA Report
LK Systems AB, Report no. 33

Description of system boundaries
The scope of the EPD is cradle to gate with options, including A4, A5, C, and D. Table 1 shows the declared modules. The system boundary includes all processes needed for raw material extraction, transport, manufacturing, and disposal. Figure 1 provides an overview of the included processes.

	Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules declared	X	X	X	X	X	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	SE	SE	SE	SE	SE								SE	SE	SE	SE	SE
Specific data used	13%					-	-	-	-	-	-	-	-	-	-	-	-
Variation, products	<10%					-	-	-	-	-	-	-	-	-	-	-	-
Variation, sites	-					-	-	-	-	-	-	-	-	-	-	-	-

X = Modules included in the analysis ND = Module not declared O= Optional modules

Table 1, Modules declared, geographical scope, share of specific data (in GWP-GHG indicator) and data variation.

Content information

Table 2, shows the weight of the raw material of the declared product.

Product components	Weight, kg	Post-consumer material, weight-%	Renewable material, weight-%
EPS	0,76	0	0
Aluminium	0,21	0	0
Adhesive	0,03	0	0
TOTAL	1	0	0
Packaging materials	**Weight, kg**	**Weight-% (versus the product)**	**Weight biogenic carbon, kg C/kg**
Cardboard box	0,022	2,2	0,0064
Plastic	0,006	0,6	0
Pallet	0,0052	0,52	0,0022
TOTAL	0,0332	3,32	0,0086

The declared product contains no dangerous substances from the candidate list of SVHC for Authorization.

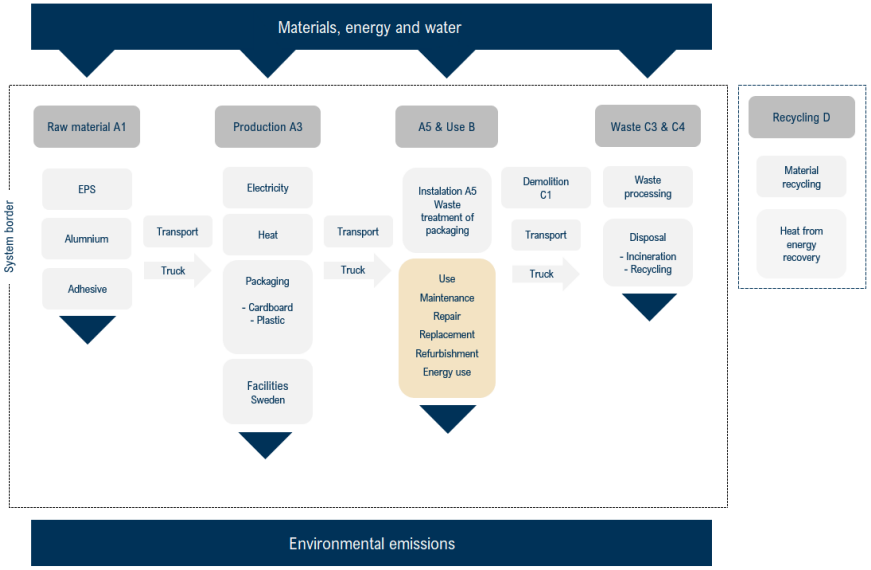


Figure 1, overview of the included processes.
Light gray represents modules included.
Yellow represents modules not declared.

Product life-cycle

Raw material supply, transport, manufacturing and packaging (A1-A3)

All the raw materials are sourced and the manufacturing process takes place in Sweden and includes the manufacturing of the raw materials used for the final product. After the manufacturing of the product is completed, it is packed in a cardboard box wrapped in plastic bands, which is then stacked on a pallet. The energy source behind electricity used in the manufacturing process is Swedish residual mix and the climate impact is 0,08 kg CO2 eq./kWh.

Transport & installation (A4-A5)

Transportation impacts represent the transport from the final product's delivery to the construction site. The transport distance is based on the average distance and is performed by truck using fuel. It is assumed that there are no environmental aspects during the installation of the product, except for the waste management of the packaging after installation.

Product End-of-Life (C1-C4, D)

The end-of-life stage (C1) of the product is assumed to have no environmental impacts during the demolition of the product. When the building where the product is installed is demolished, it is assumed that the aluminium will end up in material recycling and the plastic will be incinerated with energy recovery at 87% and the rest will be material recycled. The cardboard box is assumed to be material recycled at 78% (Fråne, A. et al., 2021), while the remaining 22% is assumed to end up in combustible waste. The product and packaging are assumed to be sent to the nearest waste facility. In the resource recovery stage, the benefits will be energy recovery and material recycling.

Cut-off rules

According to EN 15804, life cycle inventory data shall include a minimum of 95% of total inflows (mass and energy) per module. If less than 100% of the inflows are accounted for, proxy data or extrapolation should be used to achieve 100% completeness.

Background data

The data quality of the background data is considered good. All specific data, including processes, volume of different materials, energy usage, and transport distance, has been collected by questionnaire and through personal contact with the manufacturer. The Ecoinvent database, which is the world's largest LCI data library, has been used. It contains data for specific geographical regions relevant to this study, which have been analyzed to be the most suitable for the various steps in the process. Information on biogenic carbon content is calculated using the formula from EN 350-2 and information from IVL. The collected data represent average yearly data for 2022 and are assumed to be representative for the EPDs period of validity of 5 years.

Electricity data

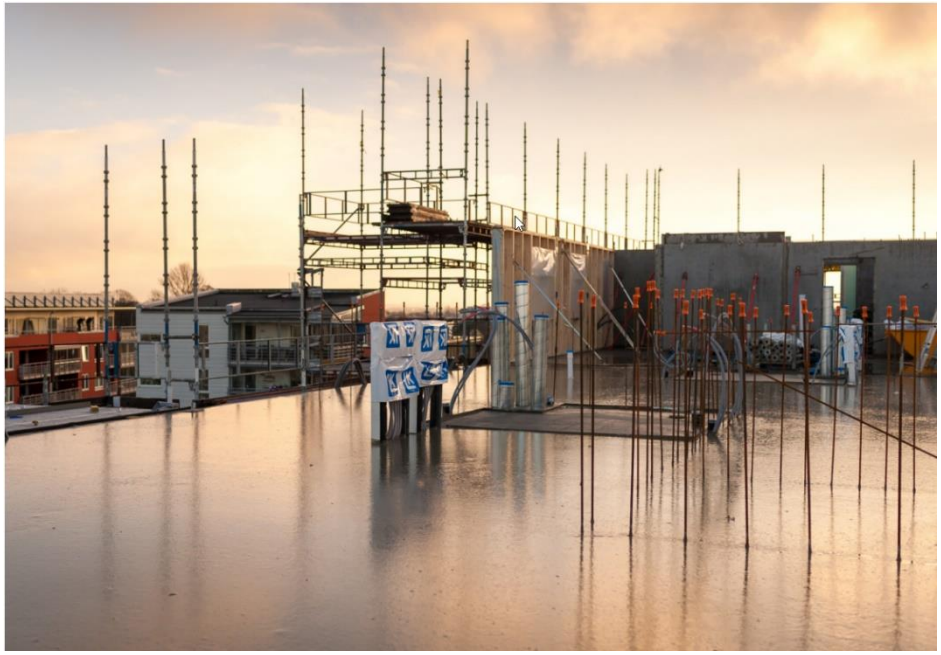
The electricity used is residual mix in Sweden. The electricity used in stage A3 accounts for less than 30% of the total energy used in stages A1-A3.

Allocation and assumptions

The declared unit values for 1 kg of the product used in this study are calculated based on the total weight of the product produced during the year under study. The content of raw materials can vary slightly between different product dimensions and is examined with high accuracy to ensure that the variation of GWP-GHG stays within 10%. Data is allocated for the energy use of the declared unit based on production rate with complexity and high accuracy. The raw materials necessary for manufacturing and the amount of packaging allocated to the product are based on the amount of material used to manufacture the declared unit, including waste. The allocation is made with complexity and high accuracy. The declared unit is based on LK CombiBoard EPS 30 and the variance of the declared products is less than 10%, based on the data quality requirements outlined in PCR 2019:14.

The used product is assumed to be transported 50 km to the nearest waste disposal facility. The waste treatment assumption has resulted in the product being incinerated for energy recovery and material recycling. The waste treatment assumes that the product is installed in the building and deconstructed when the building is demolished. The cardboard box is assumed to be material recycled at 78%. The product and packaging with plastic are assumed to be incinerated with energy recovery efficiency at 61%.

The study does not include infrastructure or capital goods.



Recycling of packaging and product

As part of our producer responsibility framework, LK is affiliated with FTI, the Packaging and Newspaper Collection, which is the business community's collection system for recycling packaging. The product with plastic and wooden packaging is to be incinerated for energy recovery and the carboard box is to be recycled as cardboard. None of the recycled materials are classified as hazardous waste.

Environmental information

Potential environmental impact – mandatory indicators according to EN 15804. Results of declared unit of the study.

The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks.

Disclaimer - The use of the results of modules A1-A3 shall consider the results of module C.

Indicator	Unit	Tot.A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-fossil	kg CO2 eq.	5,45E+00	2,12E-01	1,45E-02	0	7,43E-03	1,62E+00	0	-1,79E+00
GWP-biogenic	kg CO2 eq.	5,02E-02	1,94E-04	7,65E-03	0	6,23E-06	4,32E-04	0	0
GWP-luluc	kg CO2 eq.	3,59E-02	1,05E-04	4,31E-07	0	3,63E-06	3,34E-05	0	-3,43E-02
GWP-total	kg CO2 eq.	5,53E+00	2,12E-01	2,21E-02	0	7,44E-03	1,62E+00	0	-1,84E+00
ODP	kg CFC 11 eq.	9,41E-08	4,61E-09	9,54E-11	0	1,63E-10	9,55E-09	0	-5,41E-08
AP	mol H+ eq.	2,27E-02	4,63E-04	6,35E-06	0	3,47E-05	4,10E-04	0	-1,20E-02
EP-freshwater	kg P eq.	1,05E-03	1,51E-05	1,11E-07	0	5,36E-07	9,13E-06	0	-8,49E-04
EP-marine	kg N eq.	3,52E-03	1,17E-04	3,15E-06	0	1,38E-05	2,11E-04	0	-1,99E-03
EP-terrestrial	mol N eq.	3,45E-02	1,19E-03	2,91E-05	0	1,47E-04	1,89E-03	0	-2,20E-02
POCP	kg NMVOC eq.	1,70E-02	7,19E-04	8,03E-06	0	5,15E-05	4,93E-04	0	-7,55E-03
ADP-minerals&metals[2]	kg Sb eq.	8,01E-06	6,92E-07	2,36E-09	0	2,31E-08	1,69E-07	0	-2,60E-06
ADP-fossil[2]	MJ	1,18E+02	3,01E+00	7,38E-03	0	1,07E-01	3,14E-01	0	-2,98E+01
WDP[2]	m3	2,83E+00	1,24E-02	1,96E-04	0	4,67E-04	1,74E-02	0	-3,72E-01

Acronyms

GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic;
GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer;
AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients Innreaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment;
EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone;
ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential;
WDP = Water (user) deprivation potential, deprivation-weighted water consumption

Potential environmental impact – additional mandatory indicators according to EN 15804.

Indicator	Unit	Tot.A1-A3	A4	A5	C1	C2	C3	C4	D
Particulate matter	disease inc.	2,63E-07	1,58E-08	1,99E-10	0	7,32E-10	2,91E-09	0	-1,44E-07
Ionnising radiation[1]	kBq U-235 eq	1,43E+00	4,07E-03	2,83E-05	0	1,48E-04	2,38E-03	0	-3,87E-01
Ecotoxicity, freshwater[2]	CTUe	2,09E+01	2,97E+00	9,26E-02	0	1,06E-01	8,15E+00	0	-1,30E+01
Human toxicity, cancer[2]	CTUh	1,09E-08	1,93E-10	6,27E-12	0	8,00E-12	6,24E-10	0	-9,46E-09
Human toxicity, non-cancer[2]	CTUh	4,16E+00	1,82E+00	3,37E-03	0	8,07E-02	9,45E-02	0	-3,86E+01
Land use[2]	Pt	5,21E+00	4,27E-09	6,63E-11	0	1,66E-10	4,40E-09	0	-9,32E-08

Disclaimer 1 – This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle.
It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities.
Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

Disclaimer 2 – The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

Climate impact IPCC GWP 100

Indicator	Unit	Tot.A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-GHG	kg CO2 eq.	5,58E+00	2,13E-01	2,21E-02	0	7,49E-03	1,62E+00	0	-3,17E+00

The indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product.
This indicator is thus almost equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.

Use of resources

Indicator	Unit	Tot.A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	1,02E+01	4,73E-02	3,67E-04	0	1,70E-03	3,05E-02	0	-1,75E+01
PERM	MJ	4,08E-01	0	0	0	0	0	0	0
PERT	MJ	1,06E+01	4,73E-02	3,67E-04	0	1,70E-03	3,05E-02	0	-1,75E+01
PENRE	MJ	1,26E+02	3,20E+00	7,87E-03	0	1,14E-01	3,35E-01	0	-3,18E+01
PENRM	MJ	4,47E+01	0	0	0	0	0	0	0
PENRT	MJ	1,70E+02	3,20E+00	7,87E-03	0	1,14E-01	3,35E-01	0	-3,18E+01
SM	kg	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0
FW	m3	1,96E-02	5,04E-04	1,64E-05	0	1,94E-05	8,91E-04	0,00E+00	-1,00E-02

Acronyms

PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials;
PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources;
PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials;
PENRM = Use of non-re- newable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy re-sources;
SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels;
FW = Use of net fresh water

Note: Option C in 2019:14 Construction products (EN 15804:A2) (1.3.2) is used for calculating the primary energy use indicators.

Waste production and output flows

Waste production

Indicator	Unit	Tot.A1-A3	A4	A5	C1	C2	C3	C4	D
Hazardous waste disposed	kg	0	0	0	0	0	0	0	0
Non-hazardous waste disposed	kg	0	0	0	0	0	0	0	0
Radioactive waste disposed	kg	0	0	0	0	0	0	0	0

Note: Ecoinvent database include all waste treatment processes within the system boundaries, i.e. there are no waste flows exiting the system boundaries and the waste indicators to be declared are therefore zero.

Output flows

Indicator	Unit	Tot.A1-A3	A4	A5	C1	C2	C3	C4	D
Components for re-use	kg	0	0	0	0	0	0	0	0
Material for recycling	kg	0	0	1,10E-02	0	0	2,92E-01	0	0
Materials for energy recovery	kg	0	0	0	0	0	0	0	0
Exported energy, electricity	MJ	0	0	0	0	0	0	0	0
Exported energy, thermal	MJ	0	0	0	0	0	0	0	-4,82E-02

Information on biogenic carbon content

Results per functional or declared unit

Biogenic carbon content	Unit	Quantity
Biogenic carbon content in product	kg C	0
Biogenic carbon content in packaging	kg C	8,60E-03

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO2.

Additional information

Product	Product number	Weight (kg)
LK CombiBoard EPS 14	2410463	0,82
LK CombiBoard EPS 18	2410464	0,97
LK CombiBoard EPS 30	2410465	1,40
LK CombiBoard EPS 50	2410466	2,16
LK CombiBoard EPS 70	2410467	2,91

References

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