EPD

ENVIRONMENTAL
PRODUCT
DECLARATION

In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019/AC:2021

Glava Proff 34

Plate m/papir

Version 1

Date of publication: 2024/11/01

Validity: 5 years

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Scope of the EPD®: Norway

THE INTERNATIONAL EPD® SYSTEM

The International EPD®

Program operator: EPD international AB

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ECO PLATFORM EPD VERIFIED

Programme information

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CEN standard EN 15804:2012 + A2:2019/AC:2021 serves as the Core Product Category Rules (PCR)

Product category rules (PCR): PCR 2019:14 Construction Products, version 1.3.2

Complementary PCR: (c-PCR-005), 2024-04-30. Thermal insulation products (EN 16783:2017)

PCR review was conducted by: The Technical Committee of the International EPD. See www.environdec.com for a list of members.

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

☒ EPD verification by individual verifier

Third party verifier: Martin Erlandsson IVL Svenska Miljöinstitutet

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Approved by: The International EPD©

Procedure for follow-up of data during EPD validity involves third part verifier: ☐ Yes ☒ No

EPDs within the same product category but registered in different EPD programmes may not be comparable. For two EPDs to be comparable, they shall be based on the same PCR (including the same version number up to the first two digits) or be based on fully aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical DU/FU); 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 15804:2012+A2:2019/AC:2021 and ISO 14025:2006.

Product information

Product name: Glava Proff 34 Plate m/papir

Functional unit: 1 m^2 of product with a thermal resistance of 1 $K.m^2.W^{-1}$ and a thickness of 34 mm

UN CPC CODE: 37990 Non-metallic mineral products n.e.c. (including glass wool, expanded mineral materials, worked mica, articles of mica, non-electrical articles of graphite or other carbon and articles of peat)

GTIN Number: See chapter Additional Information: Table Conversion factors for other thicknesses.

Company information

Manufacturer: Glava AS, Nybråtveien 2. 1832 Askim, Norge

Website: www.glava.no

Production plant: Glava Askim and Glava Stjørdal, Norge

Management system-related certification: ISO 9001 and 14001

LCA & EPD Information

Owner of the declaration: Glava AS

Contact person: john.arne.bakke@glava.no

EPD® prepared by: malin.dalborg@saint-gobain.com

Type of EPD: Cradle to grave and module D

Geographical scope of the EPD®: Norway

Year of data collection: 12-month period July 2023 – June 2024

Product description

Product description and description of use

This Environmental Product Declaration (EPD) describes the environmental impacts of 1 m² of glass wool with a thermal resistance of 1 $K.m^2.W^{-1}$ of Glava Proff 34 Plate m/papir. To calculate the impact of the range of commercial thicknesses between 100 mm and 250 mm, See chapter Additional Information: Table Conversion factors for other thicknesses.

Parameter	Value / description
Quantity for 1 m2 of product	0,669 kg of finished product
Thickness	34 mm
Facing	paper
Product used for the Installation	none

For more information: www.glava.no

This EPD applies for one specific product coming from two separate plants of Glava Norway and is based on weighted arithmetic mean according to yearly production volumes of each plant. The production site of Glava in Askim and Stjørdal uses natural raw materials (sand), recycled glass cullet, and fusion and fiberizing techniques to produce glass wool. The products are obtained in the form of a "glass wool mat" characterized with a soft and airy structure.

Glass wool slab in the Glava Proff 34 family coated with paper on one side.
The primary use is thermal insulation of cold, ventilated attics or lofts, in new or existing buildings. The paper also has the function as a convection barrier, in roofs, walls and exterior walls, where the thickness of the insulation layers is large. The paper covered side should be placed in the middle of the insulation layer.

Product description in Norwegian

Plate i Proff-familien belagt med papir på én side. Brukes primært til varmeisolering av tak med kaldt loft, både nybygg og ved etterisolering. Papiret kan fungere som konveksjonssperre, ved store isolasjonstykkelser, der det isoleres i flere lag og papiret vendes inn i isolasjonssjiktet.

Technical data/physical characteristics:

Parameter	Value / description
Thermal resistance	1 $K.m^2.W^{-1}$ (EN 12667 / EN 12939)
Thermal conductivity	0,034 W/(m·K) (EN 12667 / EN 12939)
Reaction to fire	F (EN 13501-1)
Density	17,3 kg/m^3
Facing	paper 82 g/m2

Declaration of the main product components and/or materials

Description of the main components and/or materials:

Product components	Weight (%)*	Post-consumer recycled material weight (%)	Biogenic material weight-% and kg c / fu
Mineral materials	25 – 35	0	0
Recycled glass (external cullet)	56	100	0
Additives	1	0	0
Binder	4 – 6	0	0
Facing	10 – 12	0	0,029
Sum	**100%**		

*) Percentages of individual plants

Packaging materials	Weight (kg)	Weight-% (vs the product and packaging)	Biogenic material, weight- kg C / product
Wooden pallet (one pallet used one time)	0,031	4,9	0,014
Polyethylene PE	0,009	1,5	0
Shrink film, PE	0,003	0,5	0

At the date of issue of this declaration, there is no “Substance of Very High Concern” (SVHC) in concentration above 0.1% by weight, and neither do their packaging, following the European REACH regulation (Registration, Evaluation, Authorization and Restriction of Chemicals).

The verifier and the program operator do not make any claim nor have any responsibility of the legality of the product.

LCA calculation information

Parameter	Value / description
TYPE OF EPD	Cradle to grave and module D
FUNCTIONAL UNIT	Providing a thermal insulation on 1 m^2 of product with a thermal resistance of 1 $K.m^2.W^{-1}$ and a thickness of 34 mm during 60 years
SYSTEM BOUNDARIES	Cradle to grave (A1, A2, A3, A4, A5, B1–B7, C1–C4) and module D
REFERENCE SERVICE LIFE (RSL)	The Reference Service Life (RSL) of the insulation product is 60 years. This 60-year value is the amount of time that we recommend our products last for without refurbishment and corresponds to standard building design life.
CUT-OFF RULES	In the case that there is not enough information, the process energy and materials representing less than 1% of the whole energy and mass used can be excluded (if they do not cause significant impacts). The addition of all the inputs and outputs excluded cannot be bigger than the 5% of the whole mass and energy used, as well of the emissions to environment occurred. Flows related to human activities such as employee transport are excluded. The construction of plants, production of machines and transportation systems are excluded since the related flows are supposed to be negligible compared to the production of the building product when compared at these systems lifetime level.
ALLOCATIONS	Allocation in the manufacturing site (A3) is based on mass. The polluter pays and the modularity principles as well have been followed.
GEOGRAPHICAL COVERAGE AND TIME PERIOD	Scope: Norway Data is collected from Askim and Stjørdal, plant located in Norway Data collected for the 12-month period July 2023 – June 2024
BACKGROUND DATA SOURCE	The databases Sphera 2023.2 and ecoinvent v.3.9.1
SOFTWARE	Sphera LCA for experts (GaBi) 10.7

LCA scope

	Product stage			Construction stage		Use stage							End of life stage				Benefits and loads beyond the system boundary
	Raw material supply	Transport	Manufacturing	Transport	Construction-Installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-recovery
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	X	X	X	X	X	X	X	X	X	X	X	X
Geography	GLO	GLO	NO	NO	NO	-	-	-	-	-	-	-	NO	NO	NO	NO	NO
Specific data used	> 44% GWP-Fossil																
Variation products	0%																
Variation sites	-2%/+9% GWP-GHG																

Life cycle stages

A1-A3, Product stage

The product stage of the glass wool products is subdivided into 3 modules:

A1, Raw materials supply
This module includes the extraction and transformation of raw materials.

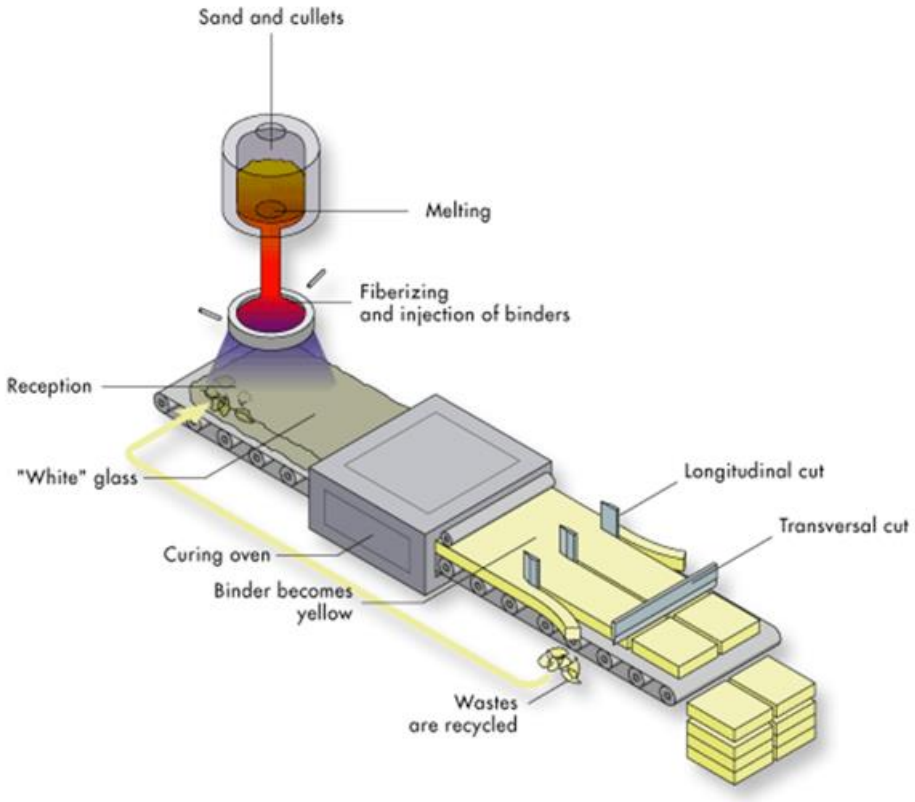
A2, Transport to the manufacturer
This module includes the transportation of raw materials and packaging to the manufacturing sites by road and boat (average values).

A3, Manufacturing
This module includes the manufacture of products such as (fusion, fiberizing, etc) and the manufacture of packaging. The production of packaging material is considered at this stage. The processing of any waste arising from this stage is also included.

Manufacturing process flow diagram

System diagram:

Glass wool process



Manufacturing in detail:
Glass wool is made from high-temperature molten glass that is blown away using centrifugal force to form fine cotton-like fibers. Then, a binder is sprayed on the material to form it, and the product is heated in an oven.

A4-A5, Construction process stage

The construction process is divided into 2 modules:

A4, Transport to the building site: This module includes transport from the production gate to the building site. Transport is calculated based on a scenario with the parameters described in the following table.

The following parameters has been used to model the waste handling of product and packaging generated on the construction site.

Parameter	Value / description
Fuel type and consumption of vehicle or vehicle type used for transport e.g., long distance truck, boat, etc.	Freight truck, maximum load weight of 27 t and consumption of 0,38 liters diesel per km. Real 5,20 t payload
Distance	300 km by truck
Capacity utilization (including empty returns)	100% of the capacity in volume 19,3% of the capacity in weight 30% of empty returns
Bulk density of transported products	63,9 kg/m^3

A5, Installation in the building: this module includes the installation of the product manually and no additional accessories, nor energy are considered

The following parameters has been used to model the waste handling of product and packaging generated on the construction site.

Parameter	Value / description
Scrap rate at installation	2% for insulation 100% for packaging
Wastage of materials on the building site before waste processing, generated by the product's installation (specified by type)	Glass wool inc. facing: 0,013 kg Wooden Pallet: 0,031 kg PE & others: 0,012 kg
Output materials (specified by type) as results of waste processing at the building site e.g., of collection for recycling, for energy recovering, disposal (specified by route)	Glass wool inc. facing: 0,013 kg to landfill Wooden Pallet: 0,031 kg 10% landfill, 90% energy recovery PE & others: 0,012 kg 10% landfill, 90% material recycling
Use of pallet	Re-used 7 times before End-of-life
Distance to waste treatment facilities	50 km by truck
Direct emissions to ambient air, soil, and water	None

B1-B7, Use stage (excluding potential savings)

The use stage is divided into the following modules:

- **B1:** Use
- **B2:** Maintenance
- **B3:** Repair
- **B4:** Replacement
- **B5:** Refurbishment
- **B6:** Operational energy use

- **B7:** Operational water use

The product has a reference service life of 60 years. This assumes that the product will last in situ with no requirements for maintenance, repair, replacement, or refurbishment throughout this period. Therefore, it has no impact at this stage.

C1-C4, End of Life Stage

This stage includes the following modules:

- **C1**: The de-construction and/or dismantling of the product takes part of the demolition of the entire building.
- **C2:** Transport to waste processing
- **C3:** Waste processing for reuse, recovery and/or recycling
- **C4:** Waste disposal, including physical pre-treatment and site management.

Description of the scenarios and additional technical information for the end of life:

Parameter	Value/description
C1: Energy for demolition	0.045 MJ/kg
C1: Collection process specified by type	The entire product 0,669 kg of glass wool including facing, is collected with mixed construction waste
C2: Assumptions for scenario development (e.g. transportation)	The waste going to landfill will be transported by truck with 24 t payload, using diesel as a fuel consuming 38 liters per 100 km Transport distance to landfill: 50 km
C3: Recovery system specified by type	There is no recovery, recycling or reuse of the product once it has reached its end-of-life phase.
C4: Disposal specified by type	0,669 kg of glass wool including facing are landfilled.

D, Reuse/recovery/recycling potential

100**%** of product waste is considered landfilled. Reuse, recycling, and/or incineration with energy recovery is considered for the packaging. Therefore, benefits or loads reported on stage D are due to the packaging.

LCA results

As specified in EN 15804:2012+A2:2019/AC:2021 and the Product-Category Rules, the environmental impacts are declared and reported using the baseline characterization factors EF 3.1. Raw materials and energy consumption, as well as transport distances have been taken directly from the manufacturing plant.

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

All emissions to air, water, and soil, and all materials and energy used have been included.

The results of the impact categories abiotic depletion of minerals and metals, land use, human toxicity (cancer), human toxicity, noncancer and ecotoxicity (freshwater) may be highly uncertain in LCAs that include capital goods/infrastructure in generic datasets, in case infrastructure/capital goods contribute greatly to the total results. This is because the LCI data of infrastructure/capital goods used to quantify these indicators in currently available generic datasets sometimes lack temporal, technological and geographical representativeness. Caution should be exercised when using the results of these indicators for decision-making purposes.

This EPD including module C, we strongly advise against using the results of modules A1-A3 without considering the results of module C.

The main result presented is calculated with GO's bought into the glass wool manufacturing site. An additional set of results based national electricity grid mix can be found in "Additional Information".

Results refer to a functional unit of 1 m^2 of glass wool with thermal resistance of 1 $K.m^2.W^{-1}$ for a thickness of 34 mm. To obtain results with different commercial thicknesses see additional information section.

Environmental Impacts

Environmental indicators	PRODUCT STAGE	CONSTRUCTION STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE LIFE CYCLE
	A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
Climate Change (total) [kg CO_2 eq.]	4,69E-01	4,79E-02	6,42E-02	0	0	0	0	0	0	0	2,62E-03	2,44E-03	0	1,25E-01	-1,77E-02
Climate Change (fossil) [kg CO_2 eq.]	6,00E-01	4,73E-02	1,58E-02	0	0	0	0	0	0	0	2,62E-03	2,41E-03	0	1,17E-02	-1,79E-02
Climate Change (biogenic) [kg CO_2 eq.]	-1,32E-01	1,25E-04	4,84E-02	0	0	0	0	0	0	0	3,31E-07	6,45E-06	0	1,13E-01	2,37E-04
Climate Change (land use change) [kg CO_2 eq.]	6,69E-04	4,43E-04	1,81E-05	0	0	0	0	0	0	0	2,95E-07	2,22E-05	0	2,96E-05	-6,74E-06
Ozone depletion [kg CFC-11 eq.]	1,05E-07	4,19E-15	2,15E-09	0	0	0	0	0	0	0	4,17E-11	3,12E-16	0	2,50E-10	-9,68E-11
Acidification terrestrial and freshwater [Mole of H+ eq.]	6,17E-03	6,37E-05	1,39E-04	0	0	0	0	0	0	0	2,43E-05	3,05E-06	0	8,16E-05	-6,97E-05
Eutrophication freshwater [kg P eq.]	1,81E-04	1,74E-07	4,18E-06	0	0	0	0	0	0	0	8,05E-08	8,76E-09	0	4,50E-07	-2,85E-06
Eutrophication marine [kg N eq.]	8,01E-04	2,35E-05	2,56E-05	0	0	0	0	0	0	0	1,13E-05	1,07E-06	0	1,53E-04	-1,02E-05
Eutrophication terrestrial [Mole of N eq.]	2,37E-02	2,73E-04	5,24E-04	0	0	0	0	0	0	0	1,23E-04	1,25E-05	0	2,19E-04	-1,22E-04
Photochemical ozone formation - human health [kg NMVOC eq.]	1,79E-03	5,64E-05	5,31E-05	0	0	0	0	0	0	0	3,63E-05	2,67E-06	0	6,47E-05	-8,70E-05
Resource use, mineral and metals [kg Sb eq.][1]	2,73E-05	3,11E-09	5,61E-07	0	0	0	0	0	0	0	9,16E-10	1,59E-10	0	6,06E-09	-5,46E-08
Resource use, energy carriers [MJ][1]	1,08E+01	6,50E-01	2,68E-01	0	0	0	0	0	0	0	3,42E-02	3,26E-02	0	1,49E-01	-7,67E-01
Water deprivation potential [m^3 world equiv.][1]	3,86E-01	5,51E-04	9,06E-03	0	0	0	0	0	0	0	1,16E-04	2,89E-05	0	2,11E-03	-1,19E-02

[1] 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

Resources Use

Resources Use indicators	PRODUCT STAGE	CONSTRUCTION STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE LIFE CYCLE
	A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
Use of renewable primary energy (PERE) [MJ] [2]	7,04E+00	4,60E-02	1,44E-01	0	0	0	0	0	0	0	1,96E-04	2,37E-03	0	2,06E-02	-1,24E-02
Use of renewable primary energy resources used as raw materials (PERM) [MJ][2]	1,65E+00	0	-4,01E-01	0	0	0	0	0	0	0	0	0	0	0	0
Total use of renewable primary energy resources (PERT) [MJ] [2]	8,70E+00	4,60E-02	-2,58E-01	0	0	0	0	0	0	0	1,96E-04	2,37E-03	0	2,06E-02	-1,24E-02
Use of non-renewable primary energy (PENRE) [MJ] [2]	9,03E+00	6,52E-01	2,32E-01	0	0	0	0	0	0	0	3,42E-02	3,28E-02	0	1,49E-01	-7,67E-01
Non-renewable primary energy resources used as raw materials (PENRM) [MJ] [2]	1,90E+00	0	-4,43E-01	0	0	0	0	0	0	0	0	0	0	0	0
Total use of non-renewable primary energy resources (PENRT) [MJ] [2]	1,09E+01	6,52E-01	-2,11E-01	0	0	0	0	0	0	0	3,42E-02	3,28E-02	0	1,49E-01	-7,67E-01
Input of secondary material (SM) [kg]	3,57E-01	0	7,14E-03	0	0	0	0	0	0	0	0	0	0	0	0
Use of renewable secondary fuels (RSF) [MJ]	5,29E-29	0	1,06E-30	0	0	0	0	0	0	0	0	0	0	0	0
Use of non-renewable secondary fuels (NRSF) [MJ]	6,22E-28	0	1,24E-29	0	0	0	0	0	0	0	0	0	0	0	0
Use of net fresh water (FW) [m3]	7,20E-03	5,07E-05	1,76E-04	0	0	0	0	0	0	0	2,70E-06	2,60E-06	0	5,62E-05	-2,78E-04

[2] From EPD International Construction Product PCR 1.3.2 (Annex 3). The option B was reatined to calculate the primary energy use indicators.

Waste Category & Output flows

	Product stage	Construction stage		Use stage							End of life stage				Benefits and loads beyond the life cycle
Waste Category & Output Flows	A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
Hazardous waste disposed (HWD) [kg]	1,76E-05	2,41E-12	5,04E-07	0	0	0	0	0	0	0	2,31E-07	1,01E-13	0	4,63E-08	-7,90E-08
Non-hazardous waste disposed (NHWD) [kg]	2,11E-01	9,40E-05	2,28E-02	0	0	0	0	0	0	0	2,12E-04	4,99E-06	0	6,81E-01	-7,98E-04
Radioactive waste disposed (RWD) [kg]	3,08E-05	8,43E-07	7,65E-07	0	0	0	0	0	0	0	3,76E-09	6,13E-08	0	1,47E-06	-3,71E-07
Components for re-use (CRU) [kg]	0	0,00E+00	2,72E-02	0	0	0	0	0	0	0	0	0	0	0	0
Materials for Recycling (MFR) [kg]	7,58E-03	0	1,13E-02	0	0	0	0	0	0	0	0	0	0	0	0
Material for Energy Recovery (MER) [kg]	0	0	4,07E-03	0	0	0	0	0	0	0	0	0	0	0	0
Exported electrical energy (EEE) [MJ]	0	0	9,22E-03	0	0	0	0	0	0	0	0	0	0	0	0
Exported thermal energy (EET) [MJ]	0	0	1,66E-02	0	0	0	0	0	0	0	0	0	0	0	0

Additional indicators from EN 15804

Environmental indicators		Product stage	Construction stage		Use stage							End of life stage				Benefits and loads beyond the life cycle
		A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
	GWP-GHG / GWP-IOBC [kg CO_2 eq.][3]	6,28E-01	4,79E-02	1,68E-02	0	0	0	0	0	0	0	2,62E-03	2,44E-03	0	2,30E-02	-1,77E-02

Information on biogenic carbon content

Biogenic Carbon Content	At factory gate
	A1 / A2 / A3
Biogenic carbon content in product [kg]	2,92E-02
Biogenic carbon content in packaging [kg]	1,36E-02

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

Regarding packaging, biogenic carbon is quantified due to wooden pallet.

[3] This indicator accounts for all greenhouse gases except biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total except that the CF for biogenic CO2 is set to zero.

Additional information:

Conversion factors for other thicknesses

This EPD® includes the range of thicknesses between 100 mm and 250 mm by applying a conversion factor. All the results of this EPD® refer to the reference thickness of 34 mm with a value of R=1 $K.m^2.W^{-1}$.

In the table below the main thicknesses of the product are listed. To convert the results of all indicators of all modules to other thicknesses, the results expressed in this EPD must be multiplied by its corresponding conversion factor in table below.

To calculate the result for 1 kg of Glava Proff 34 Plate m/papir, divide the result with the weight of the product: 0,669 kg/m^2 (conversion factor to mass 1/0,669 = 1,49)

Size (mm)	GTIN	Product thickness (mm)	Thermal resistance ($K.m^2.W^{-1}$)	Conversion factor all indicators	Conversion factor to mass)
34	--	34	1,00	1,0	1,49
100x570x1200	7032463831009	100	2,90	3,1	--
150x570x980 150x570x1200	7032463834994 7032463831504	150	4,40	4,7	--
200x570x1200	7032463832006	200	5,85	6,4	--
250x570x1200	7032463832501	250	7,35	8,0	--

Electricity information

The factory based in Askim and Stjørdal uses electricity with Guarantee of Origin certificate (GO's). Hence, the electricity mix considered for the manufacturing of the studied product is modelled according to the electricity mix described in the Guarantee of Origin certificate. The amount of electricity purchased with GO's covers 100% of the electricity consumption on the manufacturing site. Guarantee of Origin certificate (GOs) is bought from (Entelios) and a contract valid for the period 2023-2029 with the aim to be prolonged during the validity period of the EPD with the same energy mix.

Type of information	Description
Location	Electricity purchased by Saint-Gobain Nordic A/S
Share of electricity covered by Guarantee of Origin	100% of the energy consumption is covered by the GO 0% of electricity consumption is covered by residual mix
Energy sources for electricity	Share of energy sources: 100% hydro power
Reference year	For GO: 2023 *The GO will be prolonged to be valid at least to the validity of this EPD*
Type of dataset	Cradle to gate from GaBi and ecoinvent databases
Source	Cradle to gate from Sphera 2023.2 Guarantee of Origin certificate (GOs): 2023 certificate (Entelios)
CO2 emission kg CO2 eq. / kWh (Based on Climate Change Fossil Indicator)	Guarantee of Origin: 0,006 kg of CO2 eq /kWh

LCA results based on national electricity grid mix from the use of electricity in manufacturing

As specified in EN 15804:2012+A2:2019/AC:2021 and the Product-Category Rules, the environmental impacts are declared and reported using the baseline characterization factors are from the ILCD. Raw materials and energy consumption, as well as transport distances have been taken directly from the manufacturing plant. Characterization factors EN15804 based on EF 3.1.

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

All emissions to air, water, and soil, and all materials and energy used have been included.

The results of the impact categories abiotic depletion of minerals and metals, land use, human toxicity (cancer), human toxicity, noncancer and ecotoxicity (freshwater) may be highly uncertain in LCAs that include capital goods/infrastructure in generic datasets, in case infrastructure/capital goods contribute greatly to the total results. This is because the LCI data of infrastructure/capital goods used to quantify these indicators in currently available generic datasets sometimes lack temporal, technological and geographical representativeness. Caution should be exercised when using the results of these indicators for decision-making purposes.

This EPD including module C, we strongly advise against using the results of modules A1-A3 without considering the results of module C.

Results refer to a functional unit of 1 m^2 of glass wool with thermal resistance of 1 $K.m^2.W^{-1}$ for a thickness of 34 mm. To obtain results with different commercial thicknesses see additional information section.

The table below presents the information for the national electricity grid mix:

Type of information	Value / description
Location	Representative of electricity purchased by Glava AS
Geographical representativeness description	Share of energy sources national electricity Norways Hydro 93.66% Wind 4.10% Natural gas 1,52% Waste 0,31% Hard coal 0,03% Fuel oil 0,25% Biomass 0,02% Biogas 0,01% Photovoltaics 0.01%
Reference year	2022
Type of dataset	Cradle to gate from Gabi and ecoinvent databases
Source	Cradle to gate from Sphera 2023.2
CO_2 emission kg CO_2 eq. / kWh	0.038 kg of CO_2 eq/kWh Climate Change - fossil indicator

Environmental Impacts

Environmental indicators	PRODUCT STAGE	CONSTRUCTION STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE LIFE CYCLE
	A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
Climate Change (total) [kg CO_2 eq.]	5,07E-01	4,79E-02	6,49E-02	0	0	0	0	0	0	0	2,62E-03	2,44E-03	0	1,25E-01	-1,77E-02
Climate Change (fossil) [kg CO_2 eq.]	6,39E-01	4,73E-02	1,65E-02	0	0	0	0	0	0	0	2,62E-03	2,41E-03	0	1,17E-02	-1,79E-02
Climate Change (biogenic) [kg CO_2 eq.]	-1,32E-01	1,25E-04	4,84E-02	0	0	0	0	0	0	0	3,31E-07	6,45E-06	0	1,13E-01	2,37E-04
Climate Change (land use change) [kg CO_2 eq.]	6,71E-04	4,43E-04	1,81E-05	0	0	0	0	0	0	0	2,95E-07	2,22E-05	0	2,96E-05	-6,74E-06
Ozone depletion [kg CFC-11 eq.]	1,05E-07	4,19E-15	2,15E-09	0	0	0	0	0	0	0	4,17E-11	3,12E-16	0	2,50E-10	-9,68E-11
Acidification terrestrial and freshwater [Mole of H+ eq.]	6,20E-03	6,37E-05	1,40E-04	0	0	0	0	0	0	0	2,43E-05	3,05E-06	0	8,16E-05	-6,97E-05
Eutrophication freshwater [kg P eq.]	1,81E-04	1,74E-07	4,19E-06	0	0	0	0	0	0	0	8,05E-08	8,76E-09	0	4,50E-07	-2,85E-06
Eutrophication marine [kg N eq.]	8,13E-04	2,35E-05	2,59E-05	0	0	0	0	0	0	0	1,13E-05	1,07E-06	0	1,53E-04	-1,02E-05
Eutrophication terrestrial [Mole of N eq.]	2,38E-02	2,73E-04	5,27E-04	0	0	0	0	0	0	0	1,23E-04	1,25E-05	0	2,19E-04	-1,22E-04
Photochemical ozone formation - human health [kg NMVOC eq.]	1,82E-03	5,64E-05	5,37E-05	0	0	0	0	0	0	0	3,63E-05	2,67E-06	0	6,47E-05	-8,70E-05
Resource use, mineral and metals [kg Sb eq.][4]	2,73E-05	3,11E-09	5,61E-07	0	0	0	0	0	0	0	9,16E-10	1,59E-10	0	6,06E-09	-5,46E-08
Resource use, energy carriers [MJ][1]	1,15E+01	6,50E-01	2,81E-01	0	0	0	0	0	0	0	3,42E-02	3,26E-02	0	1,49E-01	-7,67E-01
Water deprivation potential [m^3 world equiv.][1]	3,54E-01	5,51E-04	8,43E-03	0	0	0	0	0	0	0	1,16E-04	2,89E-05	0	2,11E-03	-1,19E-02

[4] 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

Resources Use

Resources Use indicators	PRODUCT STAGE	CONSTRUCTION STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE LIFE CYCLE
	A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
Use of renewable primary energy (PERE) [MJ] [5]	7,49E+00	4,60E-02	1,53E-01	0	0	0	0	0	0	0	1,96E-04	2,37E-03	0	2,06E-02	-1,24E-02
Use of renewable primary energy resources used as raw materials (PERM) [MJ][2]	1,65E+00	0	-4,01E-01	0	0	0	0	0	0	0	0	0	0	0	0
Total use of renewable primary energy resources (PERT) [MJ] [2]	9,14E+00	4,60E-02	-2,49E-01	0	0	0	0	0	0	0	1,96E-04	2,37E-03	0	2,06E-02	-1,24E-02
Use of non-renewable primary energy (PENRE) [MJ] [2]	9,68E+00	6,52E-01	2,45E-01	0	0	0	0	0	0	0	3,42E-02	3,28E-02	0	1,49E-01	-7,67E-01
Non-renewable primary energy resources used as raw materials (PENRM) [MJ] [2]	1,90E+00	0	-4,43E-01	0	0	0	0	0	0	0	0	0	0	0	0
Total use of non-renewable primary energy resources (PENRT) [MJ] [2]	1,16E+01	6,52E-01	-1,98E-01	0	0	0	0	0	0	0	3,42E-02	3,28E-02	0	1,49E-01	-7,67E-01
Input of secondary material (SM) [kg]	3,57E-01	0	7,14E-03	0	0	0	0	0	0	0	0,00E+00	0,00E+00	0	0,00E+00	0,00E+00
Use of renewable secondary fuels (RSF) [MJ]	5,29E-29	0	1,06E-30	0	0	0	0	0	0	0	0,00E+00	0,00E+00	0	0,00E+00	0,00E+00
Use of non-renewable secondary fuels (NRSF) [MJ]	6,22E-28	0	1,24E-29	0	0	0	0	0	0	0	0	0	0	0	0
Use of net fresh water (FW) [m3]	1,43E-02	5,07E-05	3,18E-04	0	0	0	0	0	0	0	2,70E-06	2,60E-06	0	5,62E-05	-2,78E-04

[5] From EPD International Construction Product PCR 1.3.2 (Annex 3). The option B was reatined to calculate the primary energy use indicators.

Waste Category & Output flows

	Product stage	Construction stage		Use stage							End of life stage				Benefits and loads beyond the life cycle
Waste Category & Output Flows	A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
Hazardous waste disposed (HWD) [kg]	1,76E-05	2,41E-12	5,04E-07	0	0	0	0	0	0	0	2,31E-07	1,01E-13	0	4,63E-08	-7,90E-08
Non-hazardous waste disposed (NHWD) [kg]	2,13E-01	9,40E-05	2,29E-02	0	0	0	0	0	0	0	2,12E-04	4,99E-06	0	6,81E-01	-7,98E-04
Radioactive waste disposed (RWD) [kg]	1,43E-04	8,43E-07	3,00E-06	0	0	0	0	0	0	0	3,76E-09	6,13E-08	0	1,47E-06	-3,71E-07
Components for re-use (CRU) [kg]	0	0	2,72E-02	0	0	0	0	0	0	0	0	0	0	0	0
Materials for Recycling (MFR) [kg]	7,58E-03	0	1,13E-02	0	0	0	0	0	0	0	0	0	0	0	0
Material for Energy Recovery (MER) [kg]	0	0	4,07E-03	0	0	0	0	0	0	0	0	0	0	0	0
Exported electrical energy (EEE) [MJ]	0	0	9,22E-03	0	0	0	0	0	0	0	0	0	0	0	0
Exported thermal energy (EET) [MJ]	0	0	1,66E-02	0	0	0	0	0	0	0	0	0	0	0	0

Additional indicators from EN 15804

Environmental indicators		Product stage	Construction stage		Use stage							End of life stage				Benefits and loads beyond the life cycle
		A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
	GWP-GHG / GWP-IOBC [kg CO_2 eq.][6]	6,66E-01	4,79E-02	1,75E-02	0	0	0	0	0	0	0	2,62E-03	2,44E-03	0	2,30E-02	-1,77E-02

Information on biogenic carbon content

Biogenic Carbon Content	At factory gate
	A1 / A2 / A3
Biogenic carbon content in product [kg]	2,92E-02
Biogenic carbon content in packaging [kg]	1,36E-02

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

Regarding packaging, biogenic carbon is quantified due to wooden pallets.

[6] This indicator accounts for all greenhouse gases except biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total except that the CF for biogenic CO2 is set to zero.

References

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4. The International EPD PCR 2019:14 Construction products and Construction services. Version 1.3.2
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