

# ENVIRONMENTAL PRODUCT DECLARATION

**Lunawood Thermowood®**  
of Nordic Pine and Spruce



## Scope of the declaration

This environmental product declaration refers to the Thermowood® produced by Oy Lunawood Ltd. The declaration has been prepared in accordance with EN 15804:2012 + A2:2019 and ISO 14025 standards and the additional requirements stated in the RTS PCR 26.8.2020.

This declaration includes the life cycle stages from cradle to gate with options, modules C1-C4 and module D.



**RAKENNUSTIETO**

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# General Information, Declaration scope and verification

## 1. Owner of the declaration, manufacturer

OY LUNAWOOD LTD  
Maija Masalin  
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maija.masalin@lunawood.com

## 2. Product name and number

Lunawood Thermowood of pine and spruce. Building 2000 Product No: 244.

## 3. Place of production

The average production data of Lunawood Thermowood® are based on inventories from two Oy Lunawood Ltd mills in Kaskinen and Iisalmi (Finland).

## 4. Additional information

info@lunawood.com

## 5. Product category rules and scope of the declaration


The declaration has been prepared in accordance with EN 15804 + A2:2019 and ISO 14025 standards and additional requirements stated in RTS PCR (Version, 26.8.2020). Product specific category rules have not been applied. EPD of construction products may not be comparable if they do not comply with EN 15804 and seen in a building context.

## 6. Author of the LCA and declaration

Tarmo Rätty, Senior scientist  
Natural Resources Institute Finland (Luke),  
Latokartanonkaari 9, 00790 Helsinki, Finland, www.luke.fi

## 7. Verification

This EPD has been verified according to the requirements of ISO 14025:2010, EN 15804:2012 + A2:2019 and RTS PCR protocol by a third party. The verification has been carried out by Sigita Židonienė from Vesta Sustainability Consulting.

<b>Name and organization of third party verifier:</b>	<b>Place:</b>
Sigita Židonienė, Vesta Consulting UAB	Vilnius, Lithuania
<b>Signature:</b>	<b>Date:</b>
	13 May 2022

## 8. Declaration issue date and validity

Declaration issue date 13.5.2022 EPD is valid 5 year from verification 13.05.2022-12.5.2027

# Product Information

## 9. Products' descriptions

This EPD represents the production of Lunawood Rough Thermo Timber and Planed Lunawood Thermowood® with Thermo-S or Thermo-D treatment.

	Thermo-S	Thermo-D	CoC certification
Lunawood Rough Thermo Timber	X	X	PEFC
Lunawood Planed Thermowood®	X	X	PEFC

The letter 'S' in 'Thermo-S' stands for 'stability'. Along with appearance, stability is a key property in the end use applications of the products in this treatment class. The letter 'D' in 'Thermo-D' stands for 'durability'. Along with appearance, biological durability is a key property in the end use applications of products in this treatment class.

Products from the two mills are technically identical and this EPD presents average product on the market. The average EPD data for GWP total – indicator in this EPD differs more than 10 % between the two mills.

## 10. Results of environmental information reported per kilogram\*

Table 10a. Results of environmental information per kilogram, Lunawood Rough Thermo Timber D									
Impact	Unit	A1-A3	A3	A4*	C1	C2*	C3	C4	D
Climate change, (GWP-total)	kg CO2 eq./kg	-1,43E+00		2,90E-05	8,52E-04	1,59E-04	1,80E+00	8,50E-02	-1,91E+00
Resource use, minerals and metals, (ADP-minerals&metals)	kg Sb eq./kg	6,87E-07		6,00E-11	4,34E-10	5,55E-10	8,13E-10	4,98E-09	-6,19E-08
Resource use, fossils, (ADP-fossil)	MJ, Net calorific value/kg	4,49E+00		4,34E-04	1,16E-02	2,41E-03	1,18E-01	2,08E-02	-1,91E-01
Water use, (WDP)	m3 world eq. Deprived/kg	-2,70E-02		1,28E-06	1,65E-05	3,50E-04	1,66E-03	-5,66E-04	-1,32E-03
Biogenic carbon content in product	kg C/kg		4,88E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of secondary material	kg /kg	3,28E-04		0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-2,16E-05

\*Reported per kg of transported km

Table 10b Results of environmental information per kilogram, Lunawood Rough Thermo Timber S									
Impact	Unit	A1-A3	A3	A4*	C1	C2*	C3	C4	D
Climate change, (GWP-total)	kg CO2 eq./kg	-1,46E+00		2,90E-05	8,52E-04	1,59E-04	1,80E+00	8,50E-02	-1,91E+00
Resource use, minerals and metals, (ADP-minerals&metals)	kg Sb eq./kg	3,27E-07		6,00E-11	4,34E-10	5,55E-10	8,13E-10	4,98E-09	-6,19E-08
Resource use, fossils, (ADP-fossil)	MJ, Net calorific value/kg	4,63E+00		4,34E-04	1,16E-02	2,41E-03	1,18E-01	2,08E-02	-1,91E-01
Water use, (WDP)	m3 world eq. Deprived/kg	-2,33E-01		1,28E-06	1,65E-05	3,50E-04	1,66E-03	-5,66E-04	-1,32E-03
Biogenic carbon content in product	kg C/kg		4,88E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of secondary material	kg /kg	3,37E-04		0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-2,16E-05

\*Reported per kg of transported km

Table 10c Results of environmental information per kilogram, Lunawood Planed Thermowood® D									
Impact	Unit	A1-A3	A3	A4*	C1	C2*	C3	C4	D
Climate change, (GWP-total)	kg CO2 eq./kg	-1,34E+00		2,97E-05	9,40E-04	1,75E-04	1,80E+00	9,37E-02	-1,93E+00
Resource use, minerals and metals, (ADP-minerals&metals)	kg Sb eq./kg	7,70E-07		6,16E-11	4,79E-10	6,12E-10	8,13E-10	5,49E-09	-6,83E-08
Resource use, fossils, (ADP-fossil)	MJ, Net calorific value/kg	5,97E+00		4,45E-04	1,28E-02	2,66E-03	1,18E-01	2,29E-02	-2,11E-01
Water use, (WDP)	m3 world eq. Deprived/kg	-1,55E-02		1,32E-06	1,82E-05	3,86E-04	1,66E-03	-6,24E-04	-1,45E-03
Biogenic carbon content in product	kg C/kg		4,90E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of secondary material	kg /kg	3,61E-04		0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-2,39E-05

\*Reported per kg of transported km

Table 10d Results of environmental information per kilogram, Lunawood Planed Thermowood® S									
Impact	Unit	A1-A3	A3	A4*	C1	C2*	C3	C4	D
Climate change, (GWP-total)	kg CO2 eq./kg	-1,37E+00		2,97E-05	9,40E-04	1,75E-04	1,80E+00	9,37E-02	-1,93E+00
Resource use, minerals and metals, (ADP-minerals&metals)	kg Sb eq./kg	3,74E-07		6,16E-11	4,79E-10	6,12E-10	8,13E-10	5,49E-09	-6,83E-08
Resource use, fossils, (ADP-fossil)	MJ, Net caloric value/kg	6,12E+00		4,45E-04	1,28E-02	2,66E-03	1,18E-01	2,29E-02	-2,11E-01
Water use, (WDP)	m3 world eq. Deprived/kg	-2,43E-01		1,32E-06	1,82E-05	3,86E-04	1,66E-03	-6,24E-04	-1,45E-03
Biogenic carbon content in product	kg C/kg		4,90E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of secondary material	kg /kg	3,71E-04		0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-2,39E-05
*Reported per kg of transported km									

## 11. Description of products and their use

Lunawood is a sustainable, durable and dimensionally stable wood material for facades, landscaping and interiors and saunas, all properties achieved without chemicals naturally through Thermal Modification. Lunawood Thermowood does not require surface coatings even in the most challenging climate conditions which makes it a truly sustainable choice throughout its life cycle. This allows the project to have that naturally weathered color, if desired.

Environmental impacts of the declared unit (m<sup>3</sup>) can be converted to linear meter of a specific product using the following conversionfactors.

Planed Lunawood Thermowood® products			
Luna 15 x 92 STP Thermo-D M	0,0019	Luna 26 x 118 HLL/L PP and LDR JA SY Thermo-D	0,0040
Luna 16 x 92 SHP Thermo-D	0,002	Luna 26 x 140 SHP PF2, SHP Sauna and SHP Thermo-D	0,0048
Luna 19 x 117 Panel System, SHP, UTS and UTV Thermo D	0,0031	Luna 26 x 142 Deck 78 and UTV 62 Dual Shadow Thermo-D	0,0048
Luna 19 x 140 LunaDrop and UTV Thermo-D	0,0038	Luna 26 x 92 HLL PP and SHP Sauna, Thermo-S	0,0032
Luna 19 x 140 TGV Thermo-D	0,003749	Luna 26 x 92 LD2 PF2, SHP Sauna and SHP Thermo-D	0,0032
Luna 19 x 185 Panel System Thermo-D	0,005	Luna 32 x 140 Triple Thermo-D	0,0057
Luna 19 x 92 SHP Thermo-D	0,0025	Luna 42 x 140 SHP Thermo-D	0,0075
Luna 20 x 140 UYLS Thermo-D M	0,00375	Luna 42 x 42 SHP Thermo-D	0,0025
Luna 20 x 142 UTV HN Thermo-D	0,00375	Luna 42 x 68 SHP Thermo-D	0,00375
Luna 21 x 142 UTV 62 Embossed PP and UTV Fine Roughened Thermo-D	0,0037	Luna 42 x 92 SHP Thermo-D	0,005
Luna 26 x 117 LD2 PF2, LD2, LD2PF, SHP PF2 and HLL/LL PP Thermo-D	0,0040	Luna 43 x 43 L-Lista Thermo-D	0,0025
Lunawood Rough Thermo Timber			
22 X 100	0,0022	25 X 150	0,0038
22 X 125	0,0028	25 X 200	0,0050
22 X 225	0,0050	32 X 100	0,0032
23 X 200	0,0046	32 X 125	0,0040
25 X 100	0,0025	32 X 150	0,0048
25 X 125	0,0031	50 X 100	0,0050

## 12. Product standard

ThermoWood® Handbook, International ThermoWood Association. <https://www.thermowood.fi>.

## 13. Physical properties

	Moisture	Density at u=5%	Thickness mm	Width mm
Lunawood Rough Thermo Timber	5%	430 kg/m <sup>3</sup>	22-50	100-225
Lunawood Planed Thermowood®	5%	390 kg/m <sup>3</sup>	14-43	42-142

Treatment classes have no significant impact on dimensions & densities. The quality requirements are described in the product standard.

## 14. Raw materials of the product

Raw materials	Amount, %	Usability	Origin
Softwoods, Scots Pine* (Pinus sylvestris L. and Norway Spruce* (Picea abies L.)	100	Renewable	Finland
Also described as *Nordic Pine and **Nordic Spruce. The choice of species has no impacts on presented results.			

## 15. Substances under European Chemicals Agency`s REACH, SVHC restrictions

The product does not include substances from ECHA's Candidate List of Substances of Very High Concern.

# Scope of the Life Cycle Assessment

All covered modules are marked with X. Not relevant modules are marked as NR.  
 This declaration covers “cradle-to-gate with options, modules C1-C4 and D”.

Product stage			Construction process stage		Use stage							End of life stage				Supplementary information beyond the life cycle		
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D1	D2	D3
X	X	X	X	NR	NR	NR	NR	NR	NR	NR	NR	X	X	X	X	NR	X	NR
Raw mat	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	Recycling

This environmental product declaration refers to the Thermowood® produced by Oy Lunawood Ltd in Finland. Scenario for the modules C and D are valid for processing demolition wood in Finland only.

The reference year is 2019.

## 16. Declared unit

The declared unit is one nominal m<sup>3</sup> of Lunawood Thermowood® with 5 % moisture content. Results can be converted to linear meters using conversion factors in section 11. The results are presented as production volume weighted averages of the two mills. Inventoried products from two mills are identical such that the average presents a product on the market.

## 17. System boundaries

This EPD covers the following modules: A1 (raw material supply), A2 (transport) and A3 (manufacture), transportation to client (A4), End-of-Life (C) and supplementary information beyond the life cycle (D).

## 18. Cut-off criteria

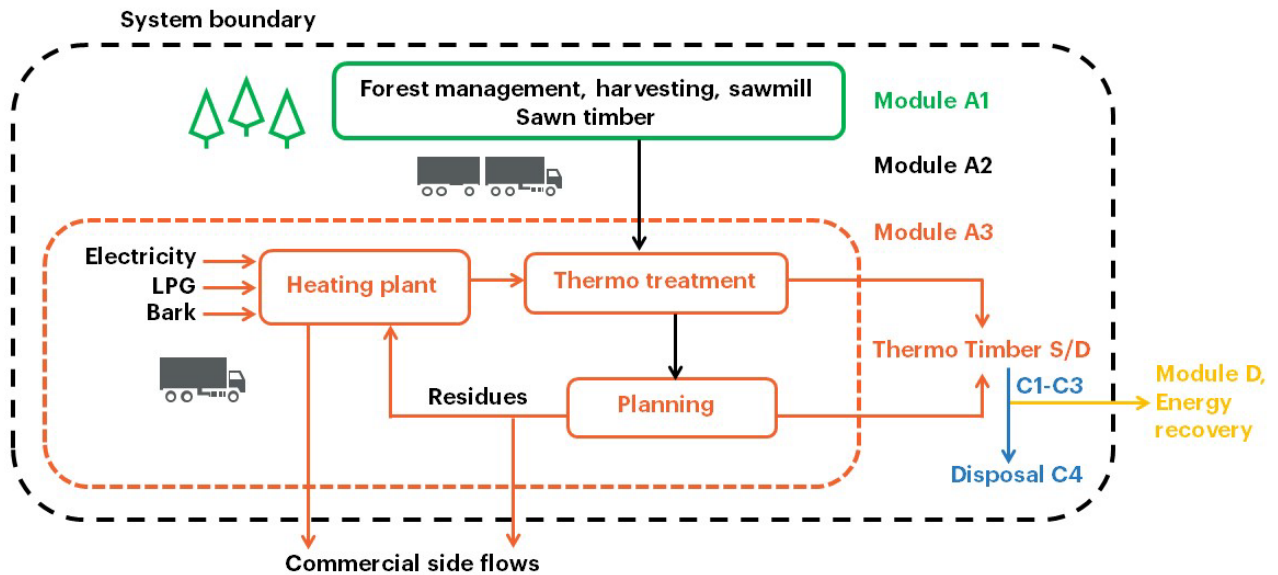
Modules A1 is based on inventory of RTS EPD 124\_21 over its modules A1 to A3. All the raw material transportation in A2 is inventoried. In module A3 all energy use, including mills’ own heat plants, other material usage, use of machinery in the mills, packing materials, production waste treatment and necessary transportation of goods have been included. Module A4 is inventoried as a weighted average of loads and distances to the Lunawood Ltd. clients. In module C scenario covers machine used for demolition (C1), transportation to the waste treatment (C2), chipping of deconstruction wood for energy wood (97 %) and waste wood (C3) and treatment of waste wood (C4). Module D presents net gains of using deconstruction wood instead of regular woody materials in a CHP plant in Finland.



### 19. Production process

Sawn timber is transported from the sawmills to Lunawood mills. The Thermowood® thermo treatment is used. The process can be divided into three main phases, where temperature is first increased and kept at high temperature (130 °C) for drying in the kiln. At the second phase, once high-temperature drying has taken place, the temperature inside the kiln is increased to 190°C ±3°C (Thermo-S) or 212°C ±3°C (Thermo-D). When the target level has been reached, the temperature remains constant for 2–3 hours depending on the treated dimensions. Finally, at phase 3, the kiln is cooled, and re-moisturising takes place to bring the wood moisture content to 4 – 7 %. Required heat is produced with liquid petroleum gas (lisalmi) and bark (Kaskinen). Otherwise, the production process requires electricity and fuels for the different equipment, as well as hydraulic and lubrication oils. Planed Thermowood® can be planed from Rough Thermo Timber on the mills or outsourced. Boards are packed and transported to the customers. Allocation of impacts between the main products is based on volumetric flows and measured energy uses. Shavings and cut-offs are either sold as side streams or used internally for energy. Allocation between main products and side streams is based on their economic value.

Allocation between main products and side streams is based on their economic value.





# Environmental Impacts and Raw Material Use

## 20. Environmental impacts

Table 20a Environmental impacts (A1-A3), Lunawood Rough Thermo Timber D								
Impact category	Unit	A1-A3	A4*	C1	C2*	C3	C4	D
Climate change, (GWP-total)	kg CO2 eq.	-6,16E+02	1,25E-02	3,66E-01	6,82E-02	7,73E+02	3,66E+01	-8,21E+02
Climate change - Fossil, (GWP-fossil)	kg CO2 eq.	1,17E+02	1,14E-02	3,66E-01	6,06E-02	1,38E+00	7,38E-01	-7,42E+00
Climate change - Biogenic, (GWP-biogenic)	kg CO2 eq.	-7,34E+02	1,04E-03	3,14E-04	7,58E-03	7,72E+02	3,58E+01	-8,14E+02
Climate Change – Land use and LU change, (GWP-luluc)	kg CO2 eq.	7,50E-01	5,56E-06	3,62E-05	2,69E-05	4,72E-02	2,80E-04	-2,11E-01
Ozone depletion, (ODP)	kg CFC 11 eq.	1,47E-05	2,87E-09	7,76E-08	1,59E-08	4,58E-08	1,12E-07	-1,84E-06
Acidification, (AP)	Mol H+ eq.	6,95E-01	1,44E-04	2,04E-03	3,45E-04	4,57E-03	6,12E-03	-3,75E-02
Eutrophication, freshwater, (EP-freshwater)	kg P eq.	1,22E-02	6,87E-07	1,12E-05	4,42E-06	4,79E-04	1,92E-04	-9,29E-04
Eutrophication, marine, (EP-marine)	kg N eq.	2,62E-01	4,01E-05	8,21E-04	1,19E-04	1,29E-03	3,36E-03	-1,38E-02
Eutrophication, terrestrial, (EP-terrestrial)	mol N eq.	2,83E+00	4,43E-04	9,00E-03	1,30E-03	9,15E-03	2,85E-02	-1,48E-01
Photochemical ozone formation, (POCP)	kg NMVOC eq.	7,34E-01	1,22E-04	2,55E-03	3,70E-04	3,32E-03	7,42E-03	-6,32E-02
Resource use, minerals and metals, (ADP-minerals&metals)	kg Sb eq.	2,95E-04	2,58E-08	1,87E-07	2,39E-07	3,50E-07	2,14E-06	-2,66E-05
Resource use, fossils, (ADP-fossil)	MJ, LHV	1,93E+03	1,87E-01	4,98E+00	1,04E+00	5,08E+01	8,93E+00	-8,21E+01
Water use, (WDP)	M3, world eq. deprived	-1,16E+01	5,52E-04	7,10E-03	1,50E-01	7,15E-01	-2,43E-01	-5,67E-01
*Reported per transported km								

Table 20b Environmental impacts (A1-A3), Lunawood Rough Thermo Timber S								
Impact category	Unit	A1-A3	A4*	C1	C2*	C3	C4	D
Climate change, (GWP-total)	kg CO2 eq.	-6,30E+02	1,25E-02	3,66E-01	6,82E-02	7,73E+02	3,66E+01	-8,21E+02
Climate change - Fossil, (GWP-fossil)	kg CO2 eq.	8,48E+01	1,14E-02	3,66E-01	6,06E-02	1,38E+00	7,38E-01	-7,42E+00
Climate change - Biogenic, (GWP-biogenic)	kg CO2 eq.	-7,16E+02	1,04E-03	3,14E-04	7,58E-03	7,72E+02	3,58E+01	-8,14E+02
Climate Change – Land use and LU change, (GWP-luluc)	kg CO2 eq.	1,29E+00	5,56E-06	3,62E-05	2,69E-05	4,72E-02	2,80E-04	-2,11E-01
Ozone depletion, (ODP)	kg CFC 11 eq.	1,28E-05	2,87E-09	7,76E-08	1,59E-08	4,58E-08	1,12E-07	-1,84E-06
Acidification, (AP)	Mol H+ eq.	8,23E-01	1,44E-04	2,04E-03	3,45E-04	4,57E-03	6,12E-03	-3,75E-02
Eutrophication, freshwater, (EP-freshwater)	kg P eq.	1,47E-02	6,87E-07	1,12E-05	4,42E-06	4,79E-04	1,92E-04	-9,29E-04
Eutrophication, marine, (EP-marine)	kg N eq.	3,31E-01	4,01E-05	8,21E-04	1,19E-04	1,29E-03	3,36E-03	-1,38E-02
Eutrophication, terrestrial, (EP-terrestrial)	mol N eq.	3,58E+00	4,43E-04	9,00E-03	1,30E-03	9,15E-03	2,85E-02	-1,48E-01
Photochemical ozone formation, (POCP)	kg NMVOC eq.	9,04E-01	1,22E-04	2,55E-03	3,70E-04	3,32E-03	7,42E-03	-6,32E-02
Resource use, minerals and metals, (ADP-minerals&metals)	kg Sb eq.	1,41E-04	2,58E-08	1,87E-07	2,39E-07	3,50E-07	2,14E-06	-2,66E-05
Resource use, fossils, (ADP-fossil)	MJ, LHV	1,99E+03	1,87E-01	4,98E+00	1,04E+00	5,08E+01	8,93E+00	-8,21E+01
Water use, (WDP)	M3, world eq. deprived		5,52E-04	7,10E-03	1,50E-01	7,15E-01	-2,43E-01	-5,67E-01
*Reported per transported km								

**Table 20c Environmental impacts (A1-A3), Lunawood Planed Thermowood® D**

Impact category	Unit	A1-A3	A4*	C1	C2*	C3	C4	D
Climate change, (GWP-total)	kg CO2 eq.	-5,22E+02	1,16E-02	3,66E-01	6,82E-02	7,03E+02	3,66E+01	-7,52E+02
Climate change - Fossil, (GWP-fossil)	kg CO2 eq.	1,28E+02	1,06E-02	3,66E-01	6,06E-02	1,25E+00	7,38E-01	-7,42E+00
Climate change - Biogenic, (GWP-biogenic)	kg CO2 eq.	-6,52E+02	9,77E-04	3,14E-04	7,58E-03	7,02E+02	3,58E+01	-7,44E+02
Climate Change – Land use and LU change, (GWP-luluc)	kg CO2 eq.	1,10E+00	5,13E-06	3,62E-05	2,69E-05	4,28E-02	2,80E-04	-2,11E-01
Ozone depletion, (ODP)	kg CFC 11 eq.	1,53E-05	2,66E-09	7,76E-08	1,59E-08	4,15E-08	1,12E-07	-1,84E-06
Acidification, (AP)	Mol H+ eq.	7,35E-01	1,32E-04	2,04E-03	3,45E-04	4,15E-03	6,12E-03	-3,75E-02
Eutrophication, freshwater, (EP-freshwater)	kg P eq.	1,59E-02	6,40E-07	1,12E-05	4,42E-06	4,34E-04	1,92E-04	-9,29E-04
Eutrophication, marine, (EP-marine)	kg N eq.	2,73E-01	3,68E-05	8,21E-04	1,19E-04	1,17E-03	3,36E-03	-1,38E-02
Eutrophication, terrestrial, (EP-terrestrial)	mol N eq.	2,92E+00	4,07E-04	9,00E-03	1,30E-03	8,29E-03	2,85E-02	-1,48E-01
Photochemical ozone formation, (POCP)	kg NMVOC eq.	7,65E-01	1,12E-04	2,55E-03	3,70E-04	3,01E-03	7,42E-03	-6,32E-02
Resource use, minerals and metals, (ADP-minerals&metals)	kg Sb eq.	3,00E-04	2,40E-08	1,87E-07	2,39E-07	3,17E-07	2,14E-06	-2,66E-05
Resource use, fossils, (ADP-fossil)	MJ, LHV	2,33E+03	1,73E-01	4,98E+00	1,04E+00	4,61E+01	8,93E+00	-8,21E+01
Water use, (WDP)	M3, world eq. deprived	-6,05E+00	5,15E-04	7,10E-03	1,50E-01	6,48E-01	-2,43E-01	-5,67E-01
*Reported per transported km								

**Table 20d Environmental impacts (A1-A3), Lunawood Planed Thermowood® S**

Impact category	Unit	A1-A3	A4*	C1	C2*	C3	C4	D
Climate change, (GWP-total)	kg CO2 eq.	-5,36E+02	1,16E-02	3,66E-01	6,82E-02	7,03E+02	3,66E+01	-7,52E+02
Climate change - Fossil, (GWP-fossil)	kg CO2 eq.	9,61E+01	1,06E-02	3,66E-01	6,06E-02	1,25E+00	7,38E-01	-7,42E+00
Climate change - Biogenic, (GWP-biogenic)	kg CO2 eq.	-6,34E+02	9,77E-04	3,14E-04	7,58E-03	7,02E+02	3,58E+01	-7,44E+02
Climate Change – Land use and LU change, (GWP-luluc)	kg CO2 eq.	1,64E+00	5,13E-06	3,62E-05	2,69E-05	4,28E-02	2,80E-04	-2,11E-01
Ozone depletion, (ODP)	kg CFC 11 eq.	1,33E-05	2,66E-09	7,76E-08	1,59E-08	4,15E-08	1,12E-07	-1,84E-06
Acidification, (AP)	Mol H+ eq.	8,63E-01	1,32E-04	2,04E-03	3,45E-04	4,15E-03	6,12E-03	-3,75E-02
Eutrophication, freshwater, (EP-freshwater)	kg P eq.	1,84E-02	6,40E-07	1,12E-05	4,42E-06	4,34E-04	1,92E-04	-9,29E-04
Eutrophication, marine, (EP-marine)	kg N eq.	3,42E-01	3,68E-05	8,21E-04	1,19E-04	1,17E-03	3,36E-03	-1,38E-02
Eutrophication, terrestrial, (EP-terrestrial)	mol N eq.	3,67E+00	4,07E-04	9,00E-03	1,30E-03	8,29E-03	2,85E-02	-1,48E-01
Photochemical ozone formation, (POCP)	kg NMVOC eq.	9,35E-01	1,12E-04	2,55E-03	3,70E-04	3,01E-03	7,42E-03	-6,32E-02
Resource use, minerals and metals, (ADP-minerals&metals)	kg Sb eq.	1,46E-04	2,40E-08	1,87E-07	2,39E-07	3,17E-07	2,14E-06	-2,66E-05
Resource use, fossils, (ADP-fossil)	MJ, LHV	2,39E+03	1,73E-01	4,98E+00	1,04E+00	4,61E+01	8,93E+00	-8,21E+01
Water use, (WDP)	M3, world eq. deprived	-9,47E+01	5,15E-04	7,10E-03	1,50E-01	6,48E-01	-2,43E-01	-5,67E-01
*Reported per transported km								

## 21. Additional environmental impacts

Not declared (ND)

22. Use of natural resources

Table 22a Use of natural resources, Lunawood Rough Thermo Timber D								
Parameter	Unit	A1-A3	A4*	C1	C2*	C3	C4	D
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ	1,44E+03	1,63E-03	2,16E-02	1,46E-02	1,05E+01	1,17E-01	-2,54E+00
Use of renewable primary energy resources used as raw materials	MJ	8,05E+03	5,09E-04	6,39E-03	0,00E+00	7,82E+03	2,42E+02	-4,31E+03
Total use of renewable primary energy resources	MJ	9,49E+03	2,14E-03	2,80E-02	1,46E-02	7,83E+03	2,42E+02	-4,31E+03
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ	1,93E+03	1,87E-01	4,98E+00	1,04E+00	5,04E+01	8,93E+00	-8,28E+01
Use of non-renewable primary energy resources used as raw materials	MJ	3,25E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total use of non-renewable primary energy resources	MJ	1,97E+03	1,87E-01	4,98E+00	1,04E+00	5,04E+01	8,93E+00	-8,28E+01
Use of renewable secondary fuels	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of non-renewable secondary fuels	MJ	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 <sup>3</sup>	1,69E+00	2,07E-05	2,95E-04	1,23E-04	1,62E-01	-4,17E-03	9,58E-02
Use of secondary materials	kg	1,41E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-9,31E-03
*Reported per transported km								

Table 22b Use of natural resources, Lunawood Rough Thermo Timber S								
Parameter	Unit	A1-A3	A4*	C1	C2*	C3	C4	D
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ	9,52E+02	1,63E-03	2,16E-02	1,46E-02	1,05E+01	1,17E-01	-2,54E+00
Use of renewable primary energy resources used as raw materials	MJ	8,05E+03	5,09E-04	6,39E-03	0,00E+00	7,82E+03	2,42E+02	-4,31E+03
Total use of renewable primary energy resources	MJ	9,00E+03	2,14E-03	2,80E-02	1,46E-02	7,83E+03	2,42E+02	-4,31E+03
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ	1,99E+03	1,87E-01	4,98E+00	1,04E+00	5,04E+01	8,93E+00	-8,28E+01
Use of non-renewable primary energy resources used as raw materials	MJ	3,28E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total use of non-renewable primary energy resources	MJ	2,02E+03	1,87E-01	4,98E+00	1,04E+00	5,04E+01	8,93E+00	-8,28E+01
Use of renewable secondary fuels	MJ	1,15E+03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of non-renewable secondary fuels	MJ	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 <sup>3</sup>	1,29E+00	2,07E-05	2,95E-04	1,23E-04	1,62E-01	-4,17E-03	9,58E-02
Use of secondary materials	kg	1,45E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-9,31E-03
*Reported per transported km								

Table 22c Use of natural resources, Lunawood Planed Thermowood® D								
Parameter	Unit	A1-A3	A4*	C1	C2*	C3	C4	D
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ	1,59E+03	1,52E-03	2,16E-02	1,46E-02	9,51E+00	1,17E-01	-2,54E+00
Use of renewable primary energy resources used as raw materials	MJ	7,30E+03	4,73E-04	6,39E-03	0,00E+00	7,09E+03	2,19E+02	-4,31E+03
Total use of renewable primary energy resources	MJ	8,89E+03	1,99E-03	2,80E-02	1,46E-02	7,10E+03	2,19E+02	-4,31E+03
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ	2,33E+03	1,73E-01	4,98E+00	1,04E+00	4,57E+01	8,93E+00	-8,28E+01
Use of non-renewable primary energy resources used as raw materials	MJ	3,25E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total use of non-renewable primary energy resources	MJ	2,36E+03	1,73E-01	4,98E+00	1,04E+00	4,57E+01	8,93E+00	-8,28E+01
Use of renewable secondary fuels	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of non-renewable secondary fuels	MJ	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 <sup>3</sup>	2,91E+00	1,93E-05	2,95E-04	1,23E-04	1,47E-01	-4,17E-03	9,58E-02
Use of secondary materials	kg	1,41E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-9,31E-03
*Reported per transported km								

Table 22d Use of natural resources, Lunawood Planed Thermowood® S								
Parameter	Unit	A1-A3	A4*	C1	C2*	C3	C4	D
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ	1,11E+03	1,52E-03	2,16E-02	1,46E-02	9,51E+00	1,17E-01	-2,54E+00
Use of renewable primary energy resources used as raw materials	MJ	7,30E+03	4,73E-04	6,39E-03	0,00E+00	7,09E+03	2,19E+02	-4,31E+03
Total use of renewable primary energy resources	MJ	8,41E+03	1,99E-03	2,80E-02	1,46E-02	7,10E+03	2,19E+02	-4,31E+03
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ	2,38E+03	1,73E-01	4,98E+00	1,04E+00	4,57E+01	8,93E+00	-8,28E+01
Use of non-renewable primary energy resources used as raw materials	MJ	3,28E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total use of non-renewable primary energy resources	MJ	2,42E+03	1,73E-01	4,98E+00	1,04E+00	4,57E+01	8,93E+00	-8,28E+01
Use of renewable secondary fuels	MJ	1,15E+03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of non-renewable secondary fuels	MJ	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 <sup>3</sup>	2,50E+00	1,93E-05	2,95E-04	1,23E-04	1,47E-01	-4,17E-03	9,58E-02
Use of secondary materials	kg	1,45E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-9,31E-03
*Reported per transported km								

23. Biogenic carbon content

Table 23a, b Biogenic carbon content, Lunawood Rough Thermo Timber D and S		
	Unit*	A3
Biogenic carbon content in product	kg C	2,10E+02
Biogenic carbon content in accompanying packaging	kg C	3,13E+00
*1 kg biogenic carbon is equivalent to 44/12 kg of biogenic CO2.		

Table 23c, d Biogenic carbon content, Lunawood Planed Thermowood® D and S		
	Unit*	A3
Biogenic carbon content in product	kg C	1,91E+02
Biogenic carbon content in accompanying packaging	kg C	3,13E+00
*1 kg biogenic carbon is equivalent to 44/12 kg of biogenic CO2.		

24. End of life – Waste

Table 24a End of life - Waste, Lunawood Rough Thermo Timber D								
Parameter	Unit	A1-A3	A4*	C1	C2*	C3	C4	D
Hazardous waste disposed	kg	2,74E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Non-hazardous waste disposed	kg	2,65E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+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
*Reported per transported km								

Table 24b End of life - Waste, Lunawood Rough Thermo Timber S								
Parameter	Unit	A1-A3	A4*	C1	C2*	C3	C4	D
Hazardous waste disposed	kg	2,84E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Non-hazardous waste disposed	kg	2,65E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+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
*Reported per transported km								

Table 24c End of life - Waste, Lunawood Planed Thermowood® D								
Parameter	Unit	A1-A3	A4*	C1	C2*	C3	C4	D
Hazardous waste disposed	kg	2,74E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Non-hazardous waste disposed	kg	2,65E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+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
*Reported per transported km								

Table 24d End of life - Waste, Lunawood Planed Thermowood® S								
Parameter	Unit	A1-A3	A4*	C1	C2*	C3	C4	D
Hazardous waste disposed	kg	2,84E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Non-hazardous waste disposed	kg	2,65E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+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
*Reported per transported km								

25. Other environmental indicators

Table 25a Other environmental indicators, Lunawood Rough Thermo Timber D								
Indicator	Unit	A1-A3	A4	C1	C2	C3	C4	D
Components for re-use	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	kg	8,47E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for energy recovery	kg	1,95E-01	0,00E+00	0,00E+00	0,00E+00	4,17E+02	0,00E+00	0,00E+00
Exported energy	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Table 25b Other environmental indicators, Lunawood Rough Thermo Timber S								
Indicator	Unit	A1-A3	A4	C1	C2	C3	C4	D
Components for re-use	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	kg	8,77E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for energy recovery	kg	2,02E-01	0,00E+00	0,00E+00	0,00E+00	4,17E+02	0,00E+00	0,00E+00
Exported energy	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Table 25c Other environmental indicators, Lunawood Planed Thermowood® D								
Indicator	Unit	A1-A3	A4	C1	C2	C3	C4	D
Components for re-use	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	kg	8,47E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for energy recovery	kg	1,95E-01	0,00E+00	0,00E+00	0,00E+00	3,78E+02	0,00E+00	0,00E+00
Exported energy	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Table 25d Other environmental indicators, Lunawood Planed Thermowood® S								
Indicator	Unit	A1-A3	A4	C1	C2	C3	C4	D
Components for re-use	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	kg	8,77E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for energy recovery	kg	2,02E-01	0,00E+00	0,00E+00	0,00E+00	3,78E+02	0,00E+00	0,00E+00
Exported energy	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

# Scenarios and Additional Technical Information

## 26. Energy in the manufacturing phase

Table 26 Energy in the manufacturing phase, all products		
	Quantity	Data Quality
A3 Electricity, CO2 emission kg CO2 eq. per kWh	1,60E-01	Finnish grid average 2015-2019

## 27. Additional technical information, transportation of products

Table 27a Additional technical information, transport to the building site, Lunawood Rough Thermo Timber D			
Variable	Lunawood Rough Thermo Timber D and S	Lunawood Planed Thermowood® D and S	Data quality
Transport, freight, lorry >32 metric ton, EURO4 RER, Diesel l/km/m3	9,99E-03	9,06E-03	Truck >32 tn, abroad
Transport, freight, sea, container ship GLO, heavy fuel oil l/km/m3	1,10E-03	1,00E-03	Capacity 43000 tn
Distance	3,40E+03	3,40E+03	Average distance to customer
Capacity utilisation (including empty returns)	49,0 %	49 %	Road
Capacity utilisation	70,0 %	70 %	Ship
Bulk density of transported products	4,30E+02	3,90E+02	u= 5%
Volume capacity utilisation factor	NA	NA	

## 28. End-of-life process description in module C

Table 28 End-of-life process description, all products		
Process flow	Unit	Share of declared unit
Collection process specified by type	Collected separately	97 %
	Collected with mixed construction waste	3 %
Recovery system specified by type	Components for reuse	0
	Material for recycling	0
	Energy recovery	97 %
Disposal specified by type	Loss (mixed waste)	3 %
Assumptions for scenario development	Transportation distance to energy use 50 km.	

## 29. Additional information

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

### 30. References

Standards:

- ISO 14025:2010 Environmental labels and declarations. Type III environmental declarations. Principles and procedures
- ISO 14040:2006 Environmental management. Life cycle assessment. Principles and frameworks.
- ISO 14044:2006 Environmental management. Life cycle assessment. Requirements and guidelines.
- EN15804:2012+A2:2019 Sustainability of construction works. Environmental Product Declarations. Core rules for the product category of construction products.
- RTS PCR 26.8.2020 RTS PCR protocol. Building Information Foundation sr, PT 18 RT EPD Committee

Data sources:

Finnish Sawmills Association, 2021. EPD of Finnish sawn and planed timber. RTS Environmental Product Declaration No. RTS\_124\_21. [https://cer.rts.fi/wp-content/uploads/rts-epd\\_124-21\\_sahateollisuus\\_sawn-and-planed-lumber.pdf](https://cer.rts.fi/wp-content/uploads/rts-epd_124-21_sahateollisuus_sawn-and-planed-lumber.pdf) , [visited 6. April 2022].

Wernet, G., Bauer, C., Steubing, B., Reinhard, J., Moreno-Ruiz, E., and Weidema, B., 2016. The ecoinvent database version 3 (part I): over-view and methodology. The International Journal of Life Cycle Assessment, 21(9), pp.1218–1230.

ThermoWood® Handbook (2003), International ThermoWood Association. [www.thermowood.fi](http://www.thermowood.fi).