

# Environmental product declaration, Puhallusvilla blown wool, Ekovilla Oy



Product:	Ekovilla blown wool for wall and roof insulation Manufacturer:
	Ekovilla Oy, Katajanharjuntie 10, 45720 Kuusankoski
Production year:	2018
Functional unit	The functional unit is not specified as blown wool can be used in various applications. The declared unit is 1 kg of packaged product.
Method	The environmental product declaration has been prepared in accordance with the standard EN 15804:2012+A1:2014 and the RTS PCR protocol. Environmental product declarations for construction products may not be comparable with other environmental product declarations if they do not comply with this European EN standard.
EPD scope	Covers the production of blown wool in three plants (Kouvola, Kiiminki and Ylistaro)
The calculation was performed by:	VTT Technical Research Centre of Finland Ltd.
Date	31/01/2020
Further information:	From the manufacturer

Yleissääntöinä on noudatettu eurooppalaisen standardin [A1> EN 15804 <A1] vaatimuksia <sup>a</sup>	
Kansainvälisen standardin EN ISO 14025:2010 mukainen [A1> ilmoituksen ja tiedon riippumaton varmennus <A1]	
<input type="checkbox"/> sisäinen <input checked="" type="checkbox"/> ulkoinen	
(b) Kolmannen osapuolen varmentamisen on suorittanut: Tarja Häkkinen	
<sup>a</sup>	Tuoteryhmäsäännöt
<sup>b</sup>	Kolmannen osapuolen varmentaminen on vapaaehtoista yrityksiltä yrityksille suunnatuissa ympäristöselosteissa; pakollista kuluttajille suunnatuissa ympäristöselosteissa (katso standardin EN ISO 14025:2010 kohta 9.4).

## Product description

This environmental product declaration covers the production of Puhallusvilla blown wool at Ekovilla Oy's three production plants: Kuusankoski, Kiiminki and Ylistaro. Impact assessment results have been calculated using the production data for the calendar year 2018; the data are plant averages. The variance in production at the plants is not considered significant, so the results represent the average results from the three plants.

Ekovilla's blown wool is made from recycled newspaper, magnesium sulphate and boric acid. The product can be used as heat insulation and as additional heat insulation in roofs, walls and floors.

Table 1. Technical specifications	
Installation density, kg/m <sup>3</sup>	28 - 55
Thermal conductivity, $\lambda$ , W/mK	0.038
Service life, years	50 years (product manufacturer's estimate)
Technical approval	Eta / CE marking

## Scope of the EPD

This EPD covers the product stage, installation service and maintenance, repairs, dismantling, reuse, recovery of waste in material recycling, energy recovery from waste and disposal of waste. This cradle-to-grave EPD covers the whole life cycle of the product, i.e. information modules A1 to C4, as well as the impacts outside the life cycle, i.e. module D (net impacts of reuse, recovery and recycling after the life cycle).

Production and product information are based on 'actual' manufacturing data collected by the manufacturer from the production facilities. The EcoInvent database (EcoInvent 3.5, 2018) was used for the calculation of the production of additives, the ELCD database for fuel sourcing (EU15, PE International, Germany) and the up-to-date environmental profile for electricity (based on VTT's calculations of production and imports in 2018). VTT's Lipasto unit emission database (average haulage equipment in 2016) has been used as the environmental profile for transport, to which emissions from fuel sourcing have always been added according to the life cycle assessment requirements.

## Product stage (A1-3)

The product stage covers all raw materials, packaging materials, transport and the manufacturing process in the production of the blown wool. The maintenance of machinery has not been taken into account in the assessment due to its minor significance.

The manufacturer of the blown wool works with the organisation that collects recycled paper and has thus had a say on where the paper is collected. According to the manufacturer, increasing quantities of reclaimed paper are collected from the surrounding areas. Reclaimed paper is assumed to be waste, and no environmental impacts have been associated with its production.

A mineral binder was used as a dust suppressant in the production of blown wool in 2018. Of the three plants that manufactured blown wool, only the Kiiminki plant used this. The dust suppressant was only 0.36% of the total product, and its impact on the final product is insignificant. The dust suppressant was, consequently, excluded from the calculations for this assessment. Material flows of 1% or less can be excluded according to the method.

Mixed waste and recoverable incineration residue are generated in the production of blown wool. Waste processing is described at the end-of-life stage (module C).

After manufacturing, blown wool is packaged in plastic packaging. Ekovilla uses recycled plastic, which can also be recovered after use, as well as non-recyclable plastic. It is assumed in this calculation that all packaging plastic goes to incineration after use.

The carbon content of blown wool raw materials has been taken into account in the calculation. This assessment is based on a reference (Nors, M., 2009).

Raw materials for the production of blown wool are transported in a full trailer truck. It is assumed in the calculation that all transported loads are full loads, and that the transport takes place on roads.

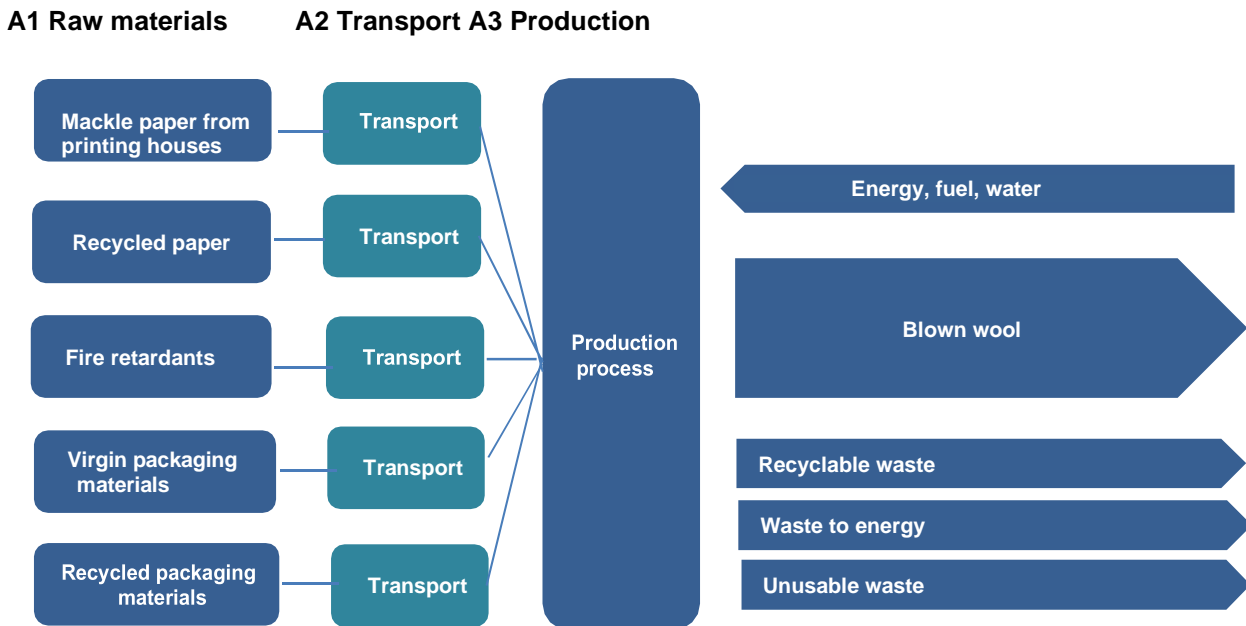


Image 1. Simplified blown wool manufacturing process.

### Construction stage (A4-5)

The packaged end product is transported to the construction site. Insulation materials are light, which means that the transport capacity is a significant factor. Blown wool is transported in a full trailer truck. The average load factor in the calculation is 45.4% (a 40-tonne truck can hold 18.144 tonnes of blown wool).

Blown wool is installed by machine on site. No waste is generated in the installation process.

### Use stage (B1-7)

According to the manufacturer, it can be assumed that during 50 years of use in normal conditions, the product will not require any maintenance or repairs. This means that the environmental impacts of stages B are 0.

### End-of-life stage (C1-4) and impacts outside the life cycle (D).

Blown wool can be removed from the structure with a vacuum machine after a building's end-of-life stage, and the product can be reused in another building. The end-of-life

stage includes the assumption that the product used is 100% reusable. Information modules in the end-of-life stage cover the following processes:

- C1 – De-construction demolition. The assessment takes into account the removal of the blown wool from the structure using a vacuum machine (energy consumption and efficiency of the vacuum machine).
- C2 – Transport during the demolition phase. Includes the transport of packaging waste to an incineration plant, the transport of mixed waste to final disposal, the transport of waste used in energy generation to an incineration plant and the transport of removed product to a temporary store.
- C3 – Waste processing:
  - Treatment of waste used for energy generation and packaging waste in an incineration plant
  - The stage also takes into account the content of biogenic carbon transferred in the recycling process to the next product system, calculated as CO<sub>2</sub>, when the impact of biogenic CO<sub>2</sub> on the GWP in a product's life cycle must be 0 according to EN16485:2014.
- C4 – Disposal of waste. Landfill treatment of mixed waste.

The impacts outside the life cycle are covered in information module D. The assumption regarding the end-of-life stage was that blown wool is 100% reusable, so that used blown wool replaces the production of new blown wool.

## Results

Table 2.a Environmental impacts (life cycle stages A1-5)

Parameters and unit	A1	A2	A3	A1-3, total	A4	A5	A1-A5, total
GWP, kg CO <sub>2</sub> eqv/kg*	0.065 +(-1.34) =-1.28*	0.016	0.006	-1.26	0.011	0.76e-03	-1.24
ADP elements, kg Sb eqv/kg	5.8e-04	6.8e-10	3.8e-05	6.2e-04	4.9e-10	1.5e-06	6.2e-04
ADP fossil fuels, MJ/kg	1.1	0.24	0.072	1.4	0.17	8.4e-03	1.6
AP, kg SO <sub>2</sub> eqv/kg	8.8e-04	7.0e-05	1.7e-05	9.6e-04	3.6e-05	2.7e-06	1.0e-03
ODP, kg CFC11 eqv/kg	1.3e-08	3.4e-11	7.7e-10	1.4e-08	2.5e-11	4.6e-10	1.4e-08
EP, kg (PO <sub>4</sub> ) <sup>-3</sup> eqv/kg	1.7e-04	1.5e-05	8.8e-06	1.9e-04	7.9e-06	5.3e-07	2.0e-04
POCP, kg C <sub>2</sub> H <sub>4</sub> eqv/kg	3.9e-05	4.7e-06	2.2e-06	4.6e-06	2.5e-06	1.2e-07	4.9e-05

ADP elements - Depletion of non-renewable mineral resources, ADP fossil fuels - Depletion of non-renewable energy resources, AP - Emissions that cause soil and water acidification, ODP - Emissions that deplete the stratospheric ozone layer, GWP - Emissions of greenhouse gases, EP - Emissions that cause eutrophication, POCP - Emissions from compounds that form photochemical ozone in the lower atmosphere.

\*The GWP of stage A1 for the production of raw materials is 0.065 kg CO<sub>2</sub>eqv/kg, and the biogenic carbon content of the raw materials, calculated as CO<sub>2</sub> is -1.34 kg CO<sub>2</sub>/kg. The negative emission is the biogenic carbon content (calculated as carbon dioxide) that is transferred from the previous product system (recovered paper) to this system.

Table 2b. Environmental impacts (life cycle stages B1-D)							
Parameters and unit	B1-7, total	C1	C2	C3	C4	C1-4, total	D
GWP, kg CO <sub>2</sub> eqv/kg*	0	4.4e-09	3.1e-03	0.017	1.9e-03	0.022	-0.086
GWP, kg CO <sub>2</sub> /kg (biogenic carbon calculated as CO <sub>2</sub> ) that goes to the next product system*	0	0	0	1.34		1.34	0
ADP elements, kg Sb eqv/kg	0	2.8e-11	1.4e-10	9.6e-07	4.3e-07	1.4e-06	-6.2e-04
ADP fossil fuels, MJ/kg (LHV)	0	5.8e-08	0.048	2.0e-03	8.4e-04	0.051	-1.4
AP, kg SO <sub>2</sub> eqv/kg	0	6.0e-12	1.0e-05	2.2e-06	3.9e-07	1.3e-05	-9.6e-04
ODP, kg CFC11 eqv/kg	0	7.8e-16	7.0e-12	1.8e-11	1.2e-11	3.7e-11	-1.4e-08
EP, kg (PO <sub>4</sub> ) <sup>-3</sup> eqv/kg	0	4.6e-12	2.3e-06	8.9e-07	2.4e-06	5.5e-06	-1.9e-04
POCP, kg C <sub>2</sub> H <sub>4</sub> eqv/kg	0	1.7e-12	7.2e-07	3.5e-08	5.0e-07	1.3e-06	-4.6e-05

\* the biogenic carbon content going to the next product system is 1.34 calculated as CO<sub>2</sub> (the assumption is that the manufacturer uses 100% of the recovered product in the manufacture of the new product. According to EN16485:2014, the impact of biogenic CO<sub>2</sub> on the GWP in a product's life cycle is 0).

Table 3a. Use of resources, primary energy (life cycle stages A1-5)							
Parameter and unit	A1	A2	A3	A1-3, total	A4	A5	A1-5, total
Use of renewable energy resources as energy, MJ/kg	0.12	3.2e-04	0.51	0.62	2.3e-04	5.5e-03	0.63
Use of renewable energy resources as raw materials, MJ/kg	0	0	0	0	0	0	0
Total use of renewable energy resources, MJ/kg	0.12	3.2e-04	0.51	0.62	2.3e-04	5.5e-03	0.63
Use of non-renewable energy resources as energy, MJ/kg	1.5	0.23	0.077	1.8	0.17	0.051	2.0
Use of non-renewable energy resources as raw materials, MJ/kg	0.25	0	0	0.25	0	0	0.25
Total use of non-renewable energy resources, MJ/kg	1.8	0.2	0.077	2.1	0.17	0.051	2.3

Table 3b. Use of resources, primary energy (life cycle stages B1-D)							
Parameter and unit	B1-7, total	C1	C2	C3	C4	C1-4, total	D
Use of renewable energy resources as energy, MJ/kg	0	1.1e-10	6.5E-05	5.5e-05	1.4e-04	2.6e-04	-0.62
Use of renewable energy resources as raw materials, MJ/kg	0	0	0	0	0	0	0
Total use of renewable energy resources, MJ/kg	0	1.1E-10	6.5E-05	5.5e-05	1.4e-04	2.6e-04	-0.62
Use of non-renewable energy resources as energy, MJ/kg	0	6.1E-08	0.048	1.8e-03	1.1e-03	0.051	-1.8
Use of non-renewable energy resources as raw materials, MJ/kg	0	0	0	0	0	0	-0.25
Total use of non-renewable energy resources, MJ/kg	0	6.1E-08	0.048	1.8e-03	1.1e-03	0.051	-2.1



Table 4a. Use of resources, other (life cycle stages A1-5)							
Parameter and unit	A1	A2	A3	A4	A5	A1-3, total	A1-A5, total
Use of recycled materials, kg/kg	0.90	0	0	0	0	0.90	0.90
Use of renewable secondary fuels, MJ/kg	0	0	0	0	0	0	0
Use of non-renewable secondary fuels, MJ/kg	0	0	0	0	0	0	0
Use of water, m <sup>3</sup>	4.5e-04	1.8e-03	2.6e-04	1.3e-03	5.5e-07	2.2e-03	3.5e-03

Table 4b. Use of resources, other (life cycle stages B1-D)							
Parameter and unit	B1-7, total	C1	C2	C3	C4	C1-4, total	D
Use of recycled materials, kg/kg	0	0	0	0	0	0	-0.90
Use of renewable secondary fuels, MJ/kg	0	0	0	0	0	0	0
Use of non-renewable secondary fuels, MJ/kg	0	0	0	0	0	0	0
Use of water, m <sup>3</sup>	0	4.9e-12	3.6E-04	5.4e-06	1.1e-06	3.6E-04	-2.2e-03

**Table 5a. Waste categories (life cycle stages A1-5)**

Parameter and unit	A1	A2	A3	A4	A5	A1-3, total	A1-A5, total
Hazardous waste, kg/kg	1.7e-05	0	5.7e-05	0	7.2e-09	7.4e-05	7.4e-05
Non-hazardous waste, kg/kg	4.0e-05	9.6e-06	7.2e-03	6.8e-06	4.9e-05	7.3e-03	7.3e-03
Radioactive waste, kg/kg	3.6e-09	4.3e-07	1.4e-07	3.1e-07	6.6e-09	5.8e-07	8.9e-07

**Table 5b. Waste categories (life cycle stages B1-D)**

Parameter and unit	B1-7, total	C1	C2	C3	C4	C1-4, total	D
Hazardous waste, kg/kg	0	5.1e-13	0	2.4e-08	3.8e-09	2.8e-08	-7.4e-05
Non-hazardous waste, kg/kg	0	1.5e-12	1.9e-06	3.1e-04	3.8e-03	4.1e-03	-7.3e-03
Radioactive waste, kg/kg	0	7.4e-14	8.7e-08	4.5e-09	7.5e-09	9.9e-08	-5.8e-07

**Table 6a. Other environmental impacts (life cycle stages A1-5)**

Parameter and unit	A1	A2	A3	A4	A5	A1-3, total	A1-A5, total
Components for reuse, kg/kg	0	0	0	0	0	0	0
Materials for recycling, kg/kg	0	0	0	0	0	0	0
Materials for energy recovery, kg/kg	0	0	0.012	0	0	0.012	0.012
Exported (used) energy, MJ/kg	0	0	0	0	0	0	0

Table 6b. Other environmental impacts (life cycle stages A1-5)							
Parameter and unit	B1-7, total	C1	C2	C3	C4	C1-4, total	D
Components for reuse, kg/kg	0	0	0	0	0	0	0
Materials for recycling, kg/kg	0	1.0	0	0	0	1.0	0
Materials for energy recovery, kg/kg	0	0	0	0	0	0	0
Exported electrical energy, MJ/kg	0	0	0	0.042	0	0.042	0
Exported thermal energy, MJ/kg	0	0	0	0.082	0	0.082	0

## References

EN 15804:2012 + A1:2013 Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products

SFS EN 16485:2014 Round and sawn timber. Environmental product declarations. Product category rules for wood and wood based products for use in construction.

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ISO 14025:2010 Environmental labels and declarations. Type III environmental declarations. Principles and procedures.

ISO 14044:2006 Environmental management. Life Cycle Assessment. Requirements and guidelines

ISO 14067:2018 Greenhouse gases Carbon footprint of products Requirements and guidelines for quantification

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